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EPA Information Mission

WILFRED ASHWORTH

New Technical Information Division Building at Thornton Research Centre

L. J. B. MOTE

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 **January 1962** **Number 1**

ASLIB CALENDAR

January

MON.22 – TUE.23. Course on work with patents and elementary patent practice.

TUE.23. Winter meeting at Aslib. Speaker: Clifford Hatts.

WED.24. Economics Group meeting at Aslib.

THUR.25. Technical Translation Group Annual General Meeting and lecture at Aslib.

February

THUR.1. Economics Group visit to Royal Society of Arts library.

MON.5 – WED.7. Junior introductory course to information work.

TUE.6. Fuel and Power Group visit to Castrol Ltd.

TUE.13. Engineering Group visit to Patent Office library.

WED.14. Economics Group visit to Richard Thomas & Baldwins library.

WED.21. Winter meeting at Aslib. Speaker: C. W. Hanson.

WED.28. Economics Group visit to Aslib.

March

THUR.1. Evening course on practical classification begins.

TUE.20. Fuel and Power Group 'Hobby-horse' evening.

THUR.22. Conference on sources of information on the Common Market at the Connaught Rooms.

April

FRI.13 – SUN.15. Aeronautical Group conference at the College of Aeronautics, Cranfield.

May

TUE.15. Fuel and Power Group Annual General Meeting.

Winter Meeting

A meeting will be held at 5.30 for 6 p.m. on Wednesday 21st February at Aslib. Tea will be served at 5.30. The speaker will be Mr C. W. Hanson, B.SC., F.I.INF.SC., Head of Aslib Research Department, who will describe some of the substantial volume of research into information and library matters now being carried out by other organizations than Aslib, particularly that in progress in the USA and USSR, and discuss its implications.

Junior Introductory Course to Information Work

A course for those who have recently taken up junior posts in special libraries and information departments will be held from 5th to 7th February at Aslib. It is designed to increase efficiency by giving a better understanding of the reasons for various routines and practices and of the functions they fulfil in the framework of an organization. Guidance will be given on further study and professional reading. Lecturers will include Mr D. J. Foskett, Librarian, London University Institute of Education; Miss Margaret Gauntlett, Kodak Research Library; Mr G. P. Henderson, Guildhall Library; Mr D. Mason, ICI Dyestuffs Division; and Mr Jack Bird, Education Officer, Aslib. The fee for the course will be 5 guineas. Application should be made on the form supplied herewith.

Course on Practical Classification

A course of twelve evening lectures on practical classification will commence on Thursday 1st March at Aslib. The course will assume no previous knowledge of classification and will be concerned with detailed classification of items of information for reference purposes rather than the arrangement of books in a library. Further details of this course are available from the Education Officer, Aslib.

Aslib Year Book

The printer of *Aslib Year Book 1961–62* regrets that a number of copies delivered were imperfectly 'perfect' bound. Any member or subscriber who has received a faultily bound copy is asked to return it immediately to Aslib for replacement. Owing to pressure of work, binding of this issue of the *Aslib Year Book* was not carried out in the printer's own bindery.

Scottish Branch

A residential conference on writing, publishing, binding, and storage of literature will be held on Friday and Saturday 16th and 17th March at the Salutation Hotel, Perth. Further details are available from the Branch Secretary, H. Greenshields, 27 Sweyn Road, Thurso, Caithness.

FID Inventory of Abstracting Services

The International Federation for Documentation (FID), with financial support from the National Science Foundation in Washington, is to make an international inventory of abstracting services covering pure and applied sciences, technology, medicine, agriculture, and social sciences. It is expected that the work will take two years and the information will be collected by means of a questionnaire, to be distributed early in February. This will contain general questions about the nature and scope of each abstracting service and requests for more detailed information such as the numbers of periodicals consulted and whether reproduction or translation services are available.

On completion of this project FID plans to establish an international information centre from which data revealed by the questionnaire may be obtained.

The Federation will welcome the assistance of all organizations having their own abstracting services. Requests for copies of the questionnaire and any relevant information should be addressed to FID, 7 Hofweg, The Hague, Netherlands.

Institute of Reprographic Technology

The Institute of Reprographic Technology Ltd (IRT) was formally inaugurated on 23rd November 1961. Its declared objects are to promote scientific knowledge and research in all aspects of reprographic work. IRT aims include improvement of the standard of knowledge in graphic reproduction technology and the effectiveness of the service provided to industry, promotion of exchange and dissemination of such knowledge, and provision of facilities for education in graphic reproduction technology. More detailed information of IRT objects, syllabus and examinations, and application forms for membership may be obtained from the Secretary, Institute of Reprographic Technology, 157 Victoria Street, London SW1.

Society of Indexers

The Society of Indexers will hold a meeting at 5.30 for 6 p.m. on Monday 12th February at the Library Association, Chaucer House, Malet Place, London WC1. Mr F. H. C. Tatham, B.A., Editor of *Whitakers Almanack* and a member of the Council of the Society of Indexers, will speak on the indexing of *Whitakers Almanack*. Time will be allowed for discussion. Members of Aslib will be welcome.

Course on Use of Chemical Literature

A short course on the use of chemical literature will be held from Wednesday 21st to Friday 23rd February at the College of Technology, Liverpool. The fee for the course will be 30*s*. Further particulars and application forms are available from the Head of the Chemistry and Biology Department, College of Technology, Byrom Street, Liverpool 3.

UDC—Abridged English Edition

The third edition of BS 1000A, *Universal Decimal Classification: Abridged English edition*, was published in December 1961. It is available from the British Standards Institution, Sales Branch, 2 Park Street, London W1, price 60*s* bound; 55*s* unbound; postage extra to non-subscribers.

International Conference on Cataloguing Principles

The Preliminary Official Report of the International Conference on Cataloguing Principles, held in Paris from 9th to 18th October 1961, is now available.

The Conference was sponsored by the International Federation of Library Associations (IFLA). Its purpose was 'to reach agreement on basic principles governing the choice and form of entry in the alphabetical catalogue of authors and titles'. Prior to the conference, working papers had been circulated to library associations and other interested organizations for study and comment and a draft Statement on Principles based on the working papers and the comments received had been prepared and issued to participants.

The conference sessions were devoted mainly to discussion and amendment of each section of the draft Statement of Principles. The final Statement of Principles received the support of a large majority of the participants and the text of it is contained in the Preliminary Official Report, together with other resolutions passed by the Conference, lists of delegations and special groups, and a summary of the votes taken at the Conference.

The Report is issued in the United Kingdom by A. H. Chaplin, Executive Secretary, International Conference on Cataloguing Principles, c/o the National Central Library, Malet Place, London WC1. It will be published in *Unesco Bulletin for Libraries* and in *Libri*.

New Year Honours

Members will be pleased to know that Sir Norman Kipping, Director-General, Federation of British Industries, and a Vice-President of Aslib, was appointed K.B.E. in the New Year Honours. Other appointments and awards of special interest to Aslib were announced as follows.

BARONET: Sir Harry Jephcott, lately Chairman, Council for Scientific and Industrial Research.

KNIGHT BACHELOR: Dr George Taylor, Director, Royal Botanic Gardens, Kew.

C.B.: Mr R. A. Wilson, Principal Keeper, Department of Printed Books, British Museum.

C.B.E.: Dr J. E. Richardson, Director of Education, The Polytechnic, Regent Street, London.

O.B.E.: Mr F. H. Banfield, lately Director of Research, British Food Manufacturing Industries Research Association; Miss Barbara Parker, Secretary and Librarian, British Society of Archaeology, Baghdad, Iraq; and Miss Brenda Tripp, Director, East Europe Department, British Council.

Iaslic Conference

The Indian Association of Special Libraries and Information Centres (Iaslic) will hold its fourth conference from Saturday 3rd to Tuesday 6th February at the Fuel Research Institute, Jealgora, Dhanbad, Bihar. Among the topics for discussion are methods and techniques of scientific communication in India, a central science library for India, and centralization or decentralization of information services. Details of the conference may be obtained from the Honorary General Secretary, Iaslic, c/o Geological Survey of India Library, 29 Chowringhee Road, Calcutta 16, India.

THE EPA INFORMATION MISSION

WILFRED ASHWORTH
Librarian and Information Officer, British Nylon Spinners Ltd

Winter meeting, London, 24th October 1961

ALMOST from the start the European Productivity Agency recognized the importance to productivity of a free flow of information and new ideas. As proof of this one has only to note its activities in this field: EPA Digests, the Question and Answer Service, provision of Technical Information Officers in the various countries, Technical Information Conferences, and even more the contribution it has made to the 'small firm problem'. Firstly, there was a Survey[1] carried out in Europe and the United States on how small firms obtain technical information which, though it revealed no more than was already known in the information world, usefully focused the attention of many other people on the unsatisfactory situation which exists. In order to widen the range of resources known to firms the next stage was to produce a directory[2] of sources of information, and this was followed by the commissioning of a pamphlet[3] giving advice to small and medium-sized firms on the setting up of technical information services. This was supplemented by a further publication[4] giving case studies of how eighteen firms solved their own information problems.

Eventually, in furtherance of the general study of this small-firm problem it was suggested, at a meeting of EPA Technical Information Officers in 1959, that it might be profitable to send a Mission around Europe to study information services in a number of selected firms. These were to be chosen from the small and medium-sized groups (<100 and $<1,000$ employees, respectively) and to be such as were known, taking individual size and resources into consideration, to handle their information particularly efficiently. The idea was to determine, if possible, the cause of their superiority in this respect and to endeavour to discover the underlying formula for success. An excellent idea, of course, but one not quite so easy to put into operation as to formulate. Nevertheless plans went ahead and the Mission began its visits in Great Britain in November, 1960, visiting twenty-three firms and institutes in five countries (United Kingdom, Denmark, Netherlands, Germany, and France) in ten working days.

The difficulties were many and obvious. The size of the sample was too small against the total number of places which could have been visited. Time was too short. The area studied too vast. More important still was the factor that results were all too likely to depend on wise choice of visits and visitors. This was in the hands of the various National Liaison Centres and must have proved extremely difficult. It was clearly useless to send investigators lacking in experience, yet those with sufficient breadth of knowledge would almost certainly be in the employment of the largest organizations and perhaps be out of touch with the stark realities of the limitation of resources available to small firms. Secondly, firms of the specified size, especially the really small ones, though they might be making perfectly adequate arrangements to handle their information needs, rarely recognize that they are doing so and may not have an information service operating as a separate entity. Such a firm might indeed make less impact on its National Liaison Centre than one which operated far less efficiently, but passed on its inquiries to the Centre. National pride militated also against inclusion of really small firms, especially as no firm would accept us unless they were able to offer hospitality to the members of the Mission.

In the final event this team, though all necessary qualifications for the study were to be found in at least one person, was not well balanced. Especially, knowledge of librarianship was lacking amongst its members. It is also fair to say that for the strict purposes of the Mission the firms visited were not well chosen, being mostly too large. Nevertheless, the interplay of ideas amongst the members of the team, strongly catalysed by the variety of things we saw on the visits made, was of a very high order. The conclusions reached by the report[5] I believe to be entirely valid although they were based on a large number of impressions rather than on any solid phalanx of fact. They could well be ascribed to the combined personal experiences of the investigators more directly than to the systems and methods we actually saw in operation. While not in any way wishing to belittle the value of the facts collected about each organization visited, which are also presented in the report, the overall picture built up contains many elements supplied by the members of the team. Without the constant stimulus to discussion caused by the visits the jigsaw would never have been completed. A team of people less involved already in information work would have certainly failed to reach any conclusions on the evidence available.

As the report of the Mission has already been published, containing a wealth of detail, I have no intention of duplicating its contents tonight. I propose instead to put forward a personal viewpoint, that of a librarian, feeling it useful to do so not only to suit my audience but because, as the only investigator with any training in librarianship, I naturally sometimes found myself the only protagonist of the documentary approach.

It is recognized that firms may obtain information from Government agencies, official organizations, universities and technical colleges, trade, professional and research associations. It may also be gleaned from attendance at exhibitions and examination of competitors' products, and help is often received from suppliers of raw materials and equipment. Outside consultants may be employed, or help obtained from former colleagues of the staff. Nevertheless, very often the most efficient and cheapest of all methods proves to be the documentary approach by reading periodicals, using books and libraries, and by creation of notes in index form.

From the very start in Great Britain, where we saw a group of firms all engaged in the instrument industry and well graded in size, we came right up against the question which was to become one of the major talking points of the tour—the stage at which a firm can profitably introduce its own library and information service. It also brought us strongly into contact with the extraordinary resistance to taking this step which firms so often put up.

The problem with the smallest firms seems to begin with change—and change and the need for information are inextricably linked. When a firm, and we saw at least two such in Germany, is entirely satisfied with its product and can readily dispose of its output, it often desires this happy state of affairs to continue. This is especially so in the family concern where expansion would require the introduction of outsiders as executives. Such a firm has little or no need for information and may find new ideas a nuisance. Nevertheless, in a progressive age change is frequently forced upon a firm from the outside. Competitors upset the balance of the market, new raw materials create problems, customers expect improvements in the product. Where the scientific content of the trade is high the need for information becomes greatly increased.

This basic resistance to change may seem to be repressed in those smaller firms which eventually allow progress to take place and which begin to expand. But so often it erupts again in a rationalized form as opposition, when ultimately an information service is formed, to the introduction of a trained information officer from outside. It is at this point that grave danger arises of an untrained and unsuitable member of the existing staff being allowed to drift into the work. In Great Britain especially we frequently heard assertions that no outsider, however well trained, could possibly become familiar with the particular firm's information needs within any reasonable time—notwithstanding that in the same firms engineers and chemists were taken on and expected to be working usefully almost from the start. Can it be that, even while outwardly belittling the value of information, the management is secretly afraid of its immense power?

In so many cases the smaller firms left the handling of information in the hands of one or two of the directors who would spend a surprising amount of their time (a total of over sixty hours a week was admitted in one German firm, and at least half the time of one director estimated in a British one) in handling information. Such a firm would be content to subscribe to a number of periodicals which would be lost fairly quickly, so much so that one British firm admitted that it was quicker to borrow back journals from their Research Association than to search around their own organization for copies.

Although the existence of a Research Association can well delay the point at which it is absolutely necessary to introduce an information service, there did appear to be some evidence that firms were sheltering behind their Association for too long. A good information officer would ensure more efficient use of the available resources of a Research Association than any we saw in operation. Often the approach to the Association was lamentably unco-ordinated, and concerned matters which were far too elementary for what the service was costing. While on this point of Research Associations it may not be irrelevant to refer to one topic which caused us a little concern. We discovered that the British firms visited were all paying their Research Association for sponsored research in addition to the ordinary membership dues. In most cases the sponsored research fee was appreciably larger and in one case up to six times the membership fee. We felt that the present tendency of the various British Research Associations to push sponsored research is not in the interests of the really small firm. It cannot afford the extra dues, and is being excluded from the results of an increasing proportion of the research done. It is recognized that the Association may benefit by being able to purchase extra and more expensive equipment, and can support a larger staff, but there may well be temptation to shun problems of general use to the whole industry in favour of those which bring in extra revenue. The situation needs watching.

In Germany postponing the establishment of information services was achieved by wider use of free-lance consultants which were a most noticeable feature of the German information scene. The consultant, as only a temporary employee, does not upset the *status quo* and, when he has finished his work, can be seen off the premises with relief akin to that often experienced domestically when a visitor (however welcome) finally departs, leaving one's home one's own again. There is, however, a real danger which was certainly not appreciated in any of the firms visited, where blind reliance was generally placed on the consultants. It is rare indeed for a consultant to make use of documentary resources to keep informed, to the extent of (say) a small information unit taking only thirty periodicals. To employ a consultant may therefore unwittingly mean that documentary resources are quite inadequately covered.

In Denmark a very different pattern of approach to information was presented to us. Apart from one organization, which was a firm too large to be considered by the Mission and with a fairly conventional information department, we were shown central organizations which, partly by distribution of abstracts and largely through the medium of field officers, assisted the many small firms in the country. It was most encouraging here to see the enthusiasm with which the field officers approached their tasks and the emphasis which they felt to be necessary in selling their services. What was far less satisfactory was the expressed remark of the head of one of the largest services 'It is not productivity to go the documentary way'. The balance between the use of personal knowledge and experience and reliance on printed records was too heavily weighted in favour of the former. Constantly extolling the virtues of their information services in the interests of publicity had become a habit and led to some complacency. A very high degree of success and widest coverage was claimed by services which proved to have access to no more than seventy or eighty periodicals. The degree of success is probably explained by the fact that 67,000 of the 70,000 firms in Denmark have, because of the small size and the few technicians employed, a very low level of information need. Most surprising was the paucity of use of abstracting journals by the libraries and organizations we visited. Generally not more than one or two per cent of periodicals taken would be abstracting journals. At very little expense extra much wider coverage of the world's literature could readily have been attained.

No attempt at all seemed to have been made by any of the organizations visited here to obtain an independent assessment of their own information services to others. Material was sent out, but the extent of use made of it was not known.

In contrast to the general lack of use of documentary material we found that in Copenhagen itself engineers and scientists by habit make full and constant use of the national and university libraries. Generally, in most countries, we found the extent of use of external libraries to be deplorably low.

In the Netherlands, as might be expected, the documentary approach was on a higher plane. Here we saw one of the best of the libraries visited (though again of a company really too large for our purposes) and I, for one, was not surprised to hear the manager responsible expressing the view that 'too many libraries are conducted by untrained people'. The difficulty here, as in other countries, however, was the real shortage of trained workers. The field officers in the Netherlands were generally working on problems of a high order, but were here able to base their replies on seven hundred technical periodicals and one hundred and twenty abstracting journals.

Germany was really outstanding for its attention to management and commercial as well as technical information. These we had found to be generally rather neglected in all the other countries visited. For a small firm, with limited resources, to spend its little money on commercial rather than technical information may well prove a better bargain. This was certainly borne out in two of the firms visited which, with a single relatively unchanging product, needed marketing rather than scientific advice.

In France we found the same reliance on documentation seen in the Netherlands but here, in most of the firms we saw, reliance was placed on the Selecto peekaboo method of indexing instead of on more conventional bibliographical methods. To some of the members of the Mission it seemed that this method had been adopted all too readily at its 'gimmick' value and by organizations whose information needs would soon grow to an extent which could hardly fail to throw some strain on the process of sorting. As some proof of this was the fact that one firm in eighteen months had run through two and a half complete series of Selecto cards with 1,500 keywords. A medium search would take half an hour. Everywhere the system was used it had been accepted as a panacea for all problems and pressed into service to retrieve facts ill-fitted to the method. It does not, for example, make a good author catalogue which an ordinary card index does so well, nor can the coding of periodical references be readily justified.

A striking feature of information dissemination in all the countries studied was the unrestricted use of photocopying quite regardless of copyright regulations. In fact the amateur handler of information wishing to pass it to any individual seems not to consider anything beyond the provision of a separate photocopy. The prevalent belief is that it is all right so long as the copy is not sold and is used only within the organization, but, even if this were true, it scarcely covers the central information agency which uses this method for sending out facts, unasked, to a wide range of outside firms.

If I were to be asked as a result of the visit to give my own formula for success in information work I should stress that in the first place it is essential for management to believe in the vital importance of information. New ideas seem to be found and to circulate to most effect wherever there is an individual in a firm with knowledge of the needs and a sense of responsibility. Even if his function is no more than that of liaison with sources of information efficiency increases. Too much reliance must not be placed on memory because good ideas do not by any means always arise at a time when they can profitably be used, and many might well be lost. In even the smallest firm an elementary system of record-keeping will eliminate this wastage, prevent total loss of accumulated knowledge when staff changes occur, may stimulate interest in information, and will certainly focus information at a central, known point.

In every growing organization there comes a time when it is more efficient and less costly to appoint an information officer rather than to employ too much of the time of executives and technical staff. This appointment should not be as long delayed as is normal practice at present. Firms must be encouraged to take the best available advice from special library associations, or from their Research Associations, to ensure that a suitably trained or experienced person is found. Contrary to popular, ill-informed belief such an information officer will soon become familiar with the firm's needs and with available resources. His experience will enable him to preserve the optimum balance in using these resources. He must, however, be given sufficiently high status to do his work. He should be made responsible directly to top management and be trusted to know the policy of his firm. He should also have all aspects of the information service under his own control, to avoid difficulties which arise if the library, commercial, technical and other services are run separately.

Information in the modern world is no job for amateurs. Even the smallest firm will do well to associate itself with research or other information-giving bodies, making it the direct responsibility of some interested and enthusiastic employee to act as liaison officer.

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NEW TECHNICAL INFORMATION DIVISION BUILDING AT THORNTON RESEARCH CENTRE

L. J. B. MOTE

THORNTON, the largest of the 'Shell' Research Centres in the United Kingdom, is about eight miles north of Chester. It occupies a forty-five-acre site and its purpose is research on oil products. Particular stress is laid on maintaining contact with manufacturers and consumers. In ensuring the successful development of new products, Thornton devotes considerable effort to the study of the fundamental phenomena involved in the performance of petroleum products.

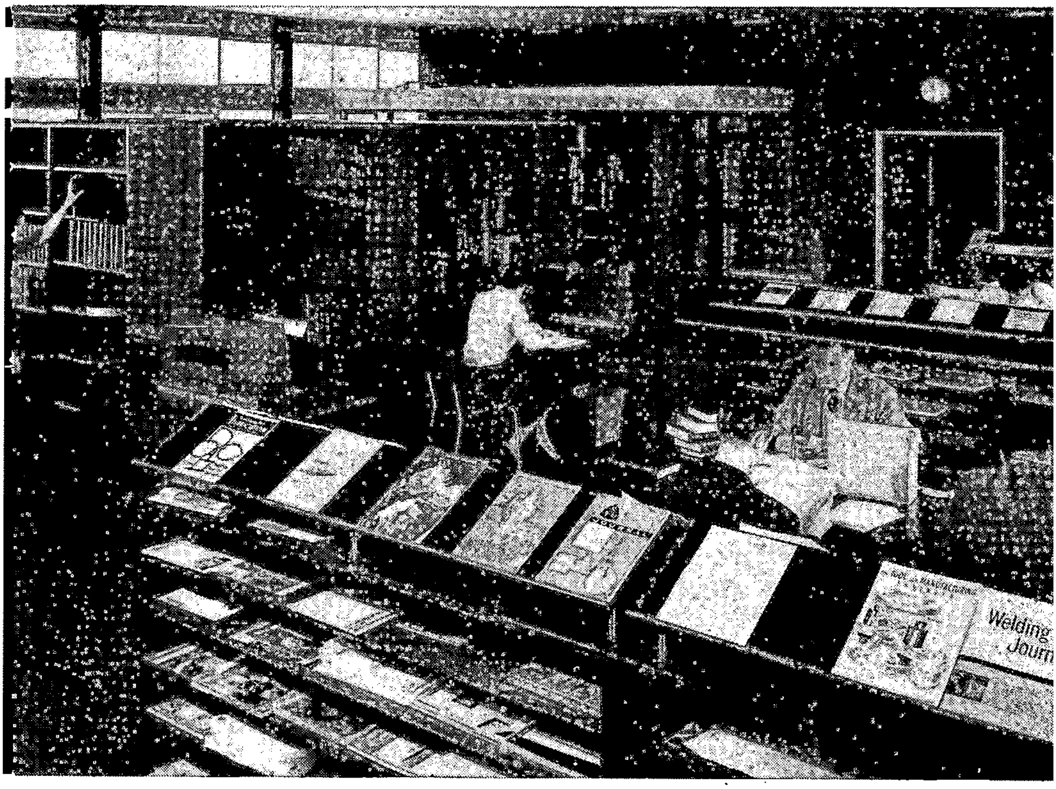
The principal buildings are: one housing groups of laboratories for research on motor gasoline, aviation fuel, transmission, and industrial lubricants, and also housing the drawing office; a building for administration offices which also houses the mathematicians; separate buildings for research on diesel fuels, engine lubricants, and bitumen; a road-test laboratory for automotive fuels and lubricants research; an applied chemistry laboratory; an analytical laboratory; stores, canteens, etc.

The most recent developments at Thornton, forming part of an extensive plan for the improvement of the research facilities, include a new building for accommodating the Technical Information Division. This building is one of a group of three new buildings, the others being for chemistry and applied physics. A lecture hall is to be added later. The buildings are interconnected by covered ways and heated by a common calorifier plant supplied with steam from the Stanlow Refinery, which adjoins the Research Centre.

It will assist the reader of this article to appreciate the special features of the design of the new Technical Information Building if a brief indication is first given of the scope of the information service that has been developed at Thornton since the first laboratory was built twenty years ago. It should be mentioned that for some ten years now the service has also been available to the Stanlow Refinery.

The following figures relate to one year's operations:

Journals	9,400
Papers, preprints, etc.	1,200
Reports (average number of copies per issue being 2)	12,660
Abstracts written	10,000
Documents received on loan from external sources	1,325
Requests (originating from abstracts) for journals, papers, etc.	5,011
Subject index cards filed	11,356
Total number of documents received (books, journals, preprints, reports, papers, specifications, etc.)	26,000



LIBRARY

The Technical Information Division consists of three principal parts: Library, Reports Section, Technical Inquiry Service.

The Library, with a staff of six, deals with the acquisition, circulation, and filing of books, journals, papers, preprints, standards, specifications, etc.

The Reports Section, also with a staff of six, handles the actual circulation of reports, as well as their acquisition and filing.

The Technical Inquiry Service is staffed by seven information scientists. In addition to answering inquiries from the Research Centre and Refinery the staff prepares abstracts from both the published and unpublished documents received, classifies them for the subject index, and carries out the important task of naming the staff to whom reports should be circulated.

TECHNICAL INFORMATION DIVISION BUILDING

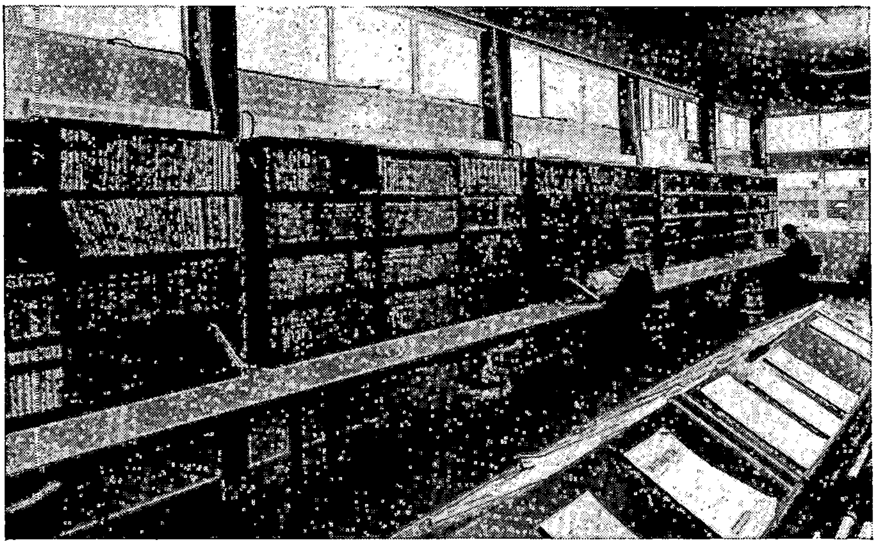
The new Technical Information building itself is 110 ft. long, 50 ft. wide and 28 ft. high, the design being based on 10 ft. modules. It is a two-storey flat-roofed building giving a total floor area of 11,000 sq. ft. Prestressed concrete is used in the framework and the exterior consists almost entirely of windows with metal panels below the window levels. The internal walls throughout the building have borrowed lights, and this, together with the generous provision of windows, results in excellent lighting conditions in daytime. Electric lighting is provided by flush-type fittings in all the ceilings, which are otherwise covered with white acoustic tiles. The floors are covered with oatmeal-coloured Marley tiles except in the Library and Reports Section, where a thick marbled grey linoleum tile is used.

GROUND FLOOR

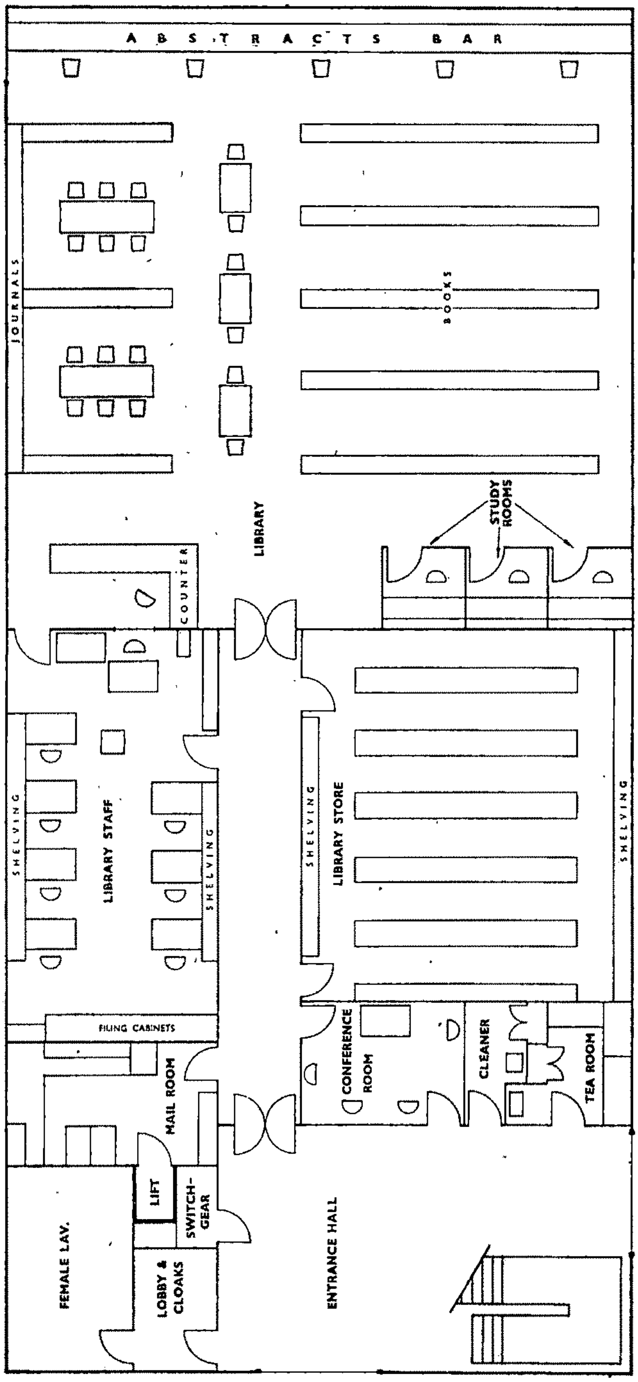
The entrance to the building is to be a common one with the adjacent lecture hall, not yet constructed. The entrance hall and staircase of the Technical Information Building are paved with 'Derbydene' carboniferous limestone formed of calcareous rocks laid on the sea-bed some 250 million years ago. Fossilized crinoids are preserved whole or broken in it, giving a particularly decorative effect. The internal walls of the entrance hall are covered with afrormosia panelling; this decorative hardwood comes from West Africa, particularly the Ashanti, and is sometimes known as Kokrodua. Afrormosia is also widely used throughout the building, all the doors being of this timber, as well as many of the fittings.

Library

A wide corridor leads to the library proper, which is square and occupies an area of 2,500 sq. ft. On the left side, low horizontal shelving in afrormosia accommodates the current journals and forms two alcoves, housing reading tables which are provided with their own lighting. The use of low shelving on one side of the library has made it possible to preserve a full view from the door to the rear wall and this accentuates the sense of space. On the right side are

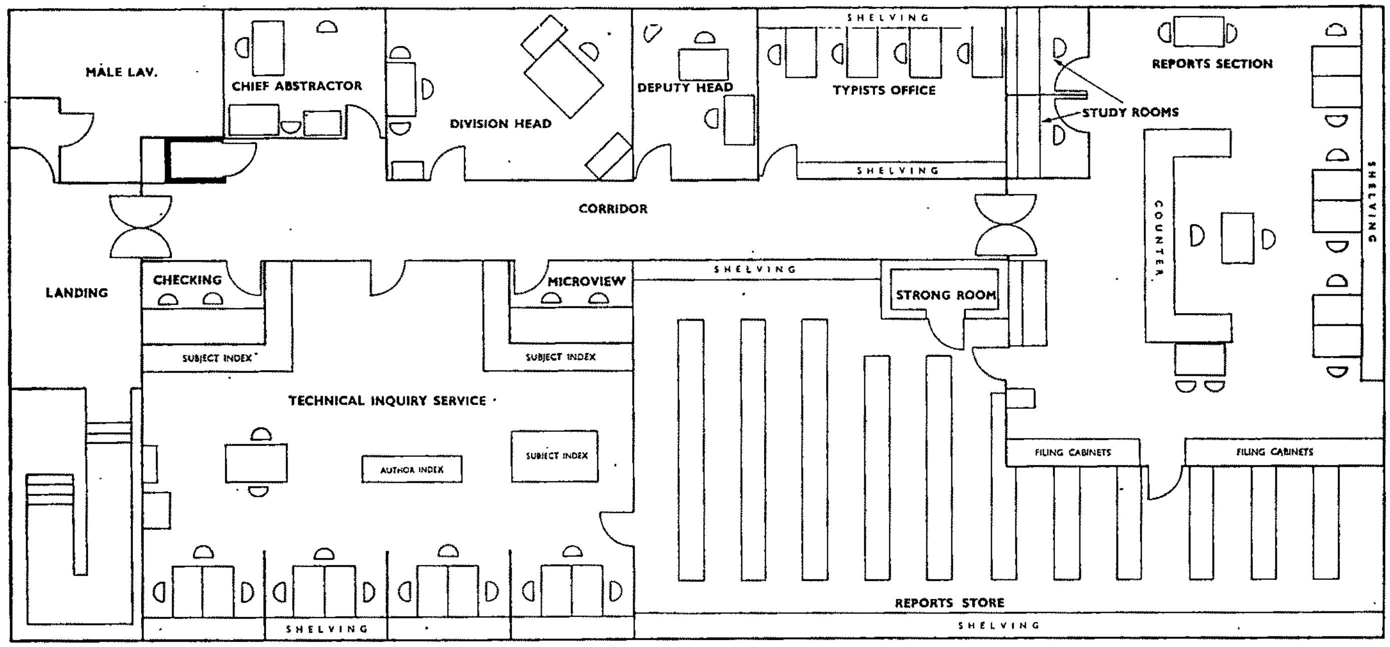


ABSTRACTS BAR



GROUND FLOOR PLAN

Technical Information Division building at Thornton Research Centre



FIRST FLOOR PLAN

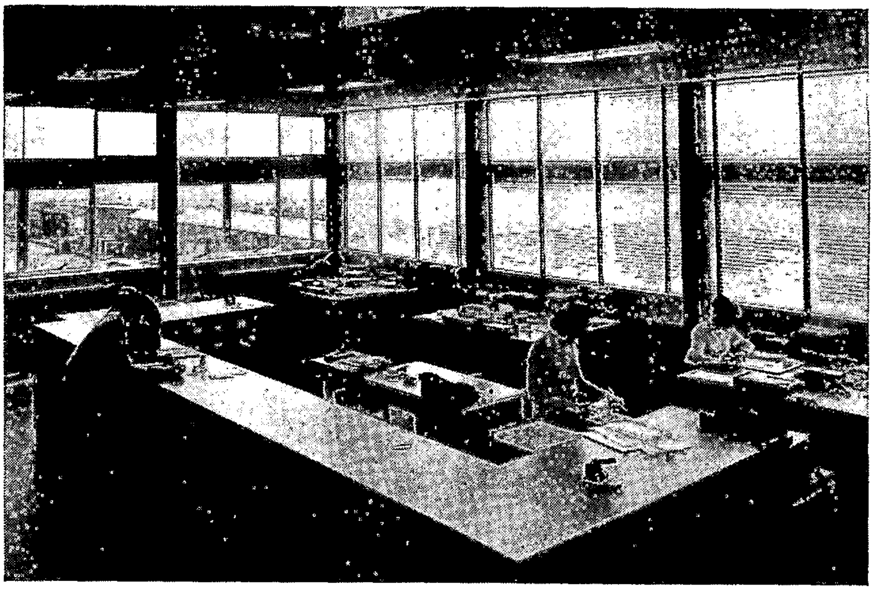
Technical Information Division building at Thornton Research Centre bookshelves, 7 ft. high, also of afrormosia, with built-in lighting. Metal channel sections have been let into the undersides of the shelves to accommodate spring-type bookholders and to increase the rigidity. Three small study rooms are provided for research workers who wish to carry out protracted examinations of the literature. These are 6 ft. 8 in. wide, and a counter running this full width provides ample space for working with many documents. The study rooms are provided with mechanical ventilation and full-length strip lighting.

An abstracts bar extending the whole length of the end wall of the library consists of a continuous counter 50 ft. long, backed by four tiers of shelves housing the published abstracts journals and indexes.

A combined desk and counter constructed of afrormosia, with the top covered with grey linoleum, is located near the door and contains the equipment required for recording loans. The library contains some 6,000 books and bound journals as well as many individual published papers, standards, trade catalogues, etc. It subscribes to about 500 journals, which are circulated to the research staff after the relevant articles have been abstracted.

Adjacent to the library and communicating with it by both a hatch and a door is the library office, accommodating five of the staff. Double pedestal desks are provided, and wherever possible a shelf 1 ft. wide has been placed at desk height along the walls to increase the working space available. A library store is situated on the other side of the corridor.

Next to the library office is a small mailing room, provided with counters and shelving subdivided into pigeon holes for sorting the mail. A goods lift opens from the mailing room and accommodates a trolley which can be loaded, dispatched to the first floor, and wheeled to any of the offices.



REPORTS SECTION

FIRST FLOOR

On the first floor, separate offices are provided for the Head of Technical Information Division, his Deputy, the Chief Abstractor and for the typists.

Reports Section

The Reports Section, in a room 36 ft. by 30 ft., organizes the circulation of the reports which are received at the rate of approximately 12,000 a year from many sources. The stock amounts to about 100,000 reports. A specially designed counter in afrormosia houses, in double drawers, all the 8 in. by 5 in. index cards necessary to indicate the readers, past and present, of each document. A shelf is provided at desk height along the southern wall where six desks are arranged. Two study rooms are available for use by research staff wishing to study documents controlled by the Reports Section. Adjacent to the Reports Section is a large store for the accommodation of documents on steel shelving. Part of the shelving is arranged for vertical filing.

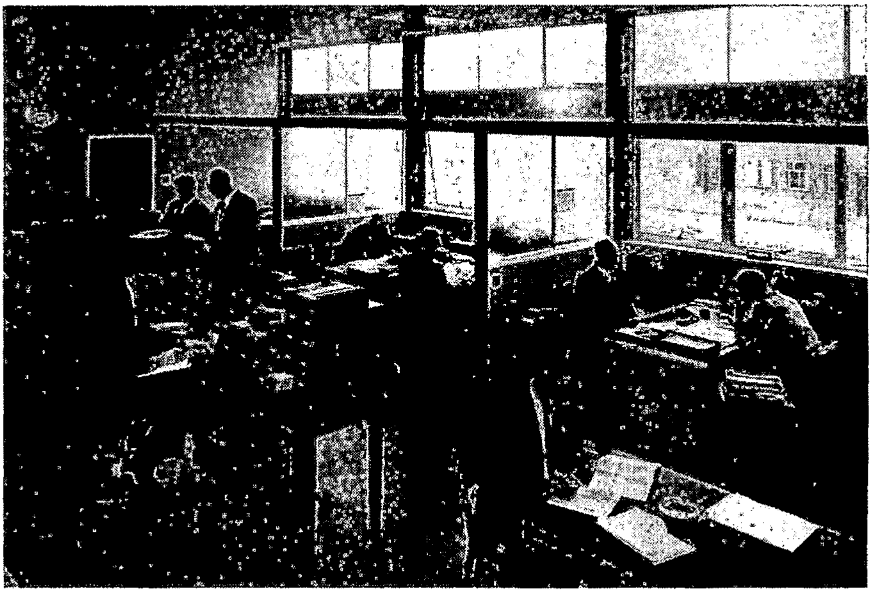
REPORTS SECTION. *Study room*

Technical Inquiry Service

The Technical Inquiry Service is conducted in a room having an area of 1,066 sq. ft. The part near the window is divided into four cubicles by three glass partitions, each cubicle being 10 ft. wide and containing two desks. Along the whole length of the room, at desk level, a shelf 1 ft. wide is again provided.

The subject indexes of approximately 150,000 cards are housed in L-shaped banks in the Technical Inquiry Service room against the walls which form the microview and checking rooms. Additional indexes and author indexes are accommodated in the centre of the room. A table and chairs are provided to facilitate consultation with 'customers'.

The microview room has a counter 10 ft. long occupying its whole length. This makes it possible to accommodate conveniently the reading equipment for microcards, microfilm, and microfiches. The microcopies are kept in eight-drawer cabinets beneath the counter. The checking room, which is provided with a similar counter, makes it possible for documents, such as abstract



TECHNICAL INQUIRY SERVICE

bulletins, to be checked aloud without disturbing the rest of the staff. These two rooms are accessible only from the corridor.

In addition to an internal automatic telephone system serving Thornton and Stanlow, a G.P.O. 'House Exchange' system, with two external lines, provides a ten-position intercommunication system within the building that can be used without going to the exchange.

The building has now been occupied for three months, and the extent to which the design is contributing to smooth working is apparent in the appreciation shown by our customers of the improved facilities provided for them.

Letters to the Editor

TECHNICAL TRANSLATIONS—MAKING THE MASTER

Dear Madam,

'Technical translations—making the master', your September 1961 issue, by J. B. Reed seeks to indicate ways to do this work economically. Some practical detail may help and I offer these comments with that intention.

I would qualify the statement that 'When cuttings are used this (checking) is entirely eliminated.' It will depend on how reliable is the worker doing the pasting up and on his knowledge of the meaning of symbols included; to invert some is to invert the sense and Greek letters inverted could cause confusion. Again there is no assurance that in the text the right symbol is in the right place, unless the translator checks it.

I recommend the following details of procedure:

1. Write text symbols into the manuscript translation, then draw a short vertical line in red ink either side of them to indicate to the typist what space to leave. So also with formulae in the text though these need not be written out; red verticals will show the approximate space needed.
2. When the typescript is received and the photocopy of the original, correlate the symbols to be cut out with the manuscript markings. This ensures that none will be missed and that the correct symbol is inserted.
3. Paste up with rubber solution from a collapsible tube, using as spreader a matchstick, end bevelled, held in a penholder or some similar tool. Surround pasting is enough for large areas; all-over for small. Follow the instructions to spread on both the ground and the paste-in, very thinly for instant drying. Iron down with an overlay, using a paperhanger's roller.
4. When the complete paste-up is done detect all symbols by feel, line by line, and rub the finger tip around each to roll off the solution squeeze-out which would otherwise photograph.
5. Check all symbols and the insertion of the correct formula in the correct place. When numbered in the original text, include this numbering and not a typed number; this assures the reader that the formulae have not become interchanged.
6. For cutting out, use a razor blade in a holder, or a craft worker's stencil knife, run along a steel rule on the cardboard back from a writing pad. A clean cut will not photograph. Handle with tweezers.
7. Remove all illustrations and tables from the text. Photocopy them. Make up sheets to paste them on in sequence, arranging space for typed captions. Block out illustration wording that has to be changed and use UNO stencils on the photocopy.
8. The text as typed is unbroken by illustrations. Staple the left margin of the text. Place illustrations and tables in order and to the right of the text

and staple their right margin. The reader can now turn any illustration up to face the text being read. The format is as a book hinged both left and and right; text left, illustrations right. Alternatively hinges for both may be at the top of the sheets.

9. By this practice the typist has straightforward full-page typing, allowing spaces only for text symbols and line spaces for formulae. Photographs may be original size or enlarged to allow stencil lettering according to clarity and detail required. Typist and photographer work ahead independently and do not need to match one another's work.

There may be better ways, if so, let us hear about them; everyone will benefit.

Yours faithfully,

W. D. ARNOT,
16 Chapel Street,
Nuneaton,
Warwickshire.

7th October 1961.

Dear Madam,

After reading the article by Mr J. B. Reed entitled 'Technical translations—making the master' in the September issue of *Aslib Proceedings,* I feel it may be of some interest to readers to know of the method used here for the production of reproducible translated texts. Naturally enough our system is based on 'Ozalid' processes.

For Ozalid processes the basic requirement is, of course, a translucent master. Our translations are therefore typed directly on Ozalid transparent paper. (All typewriters on the premises are fitted with photo-ribbons which give typed text with the necessary covering power for Ozalid reproduction.) Suitable spaces are left for diagrams and formulae which are later traced in from the foreign original with a pencil or black ball-point pen. It is true that the tracings have to be checked, but provided the matter is not excessively complicated this is no great drawback. There are of course no carbon copies to be checked. Not only pencil, but also typewriter ink can be removed from the transparent paper with soft indiarubber. The making of corrections is thus a simple matter. We always have a first Ozalid paper copy run off for correction purposes. Corrections are marked on this copy and from it the typist makes the necessary alterations to the transparency. No pages are retyped unless really extensive alterations have to be made.

Once the transparent master has been finalized, any number of Ozalid copies can be run off at any time. If large numbers of copies are later found to be necessary the transparency can be used as a master for photo-offset-lithography or duplication by photostencil.

So far I have not been faced with the problem of translating articles containing untraceable diagrams, graphs or formulae in the body of the text. Should such a problem come my way I should probably make transparent reflex diffusion-transfer copies (Copy-Rapid System) of the diagrams. The diagrams would be trimmed to shape (no masking necessary) and stuck with Sellotape in the appropriate place on the translation. The Ozalid prints made from this composite master would probably show the marks of the Sellotape, but in most cases this would not greatly matter.

Where a more 'finished' final appearance is necessary or the number of copies required justifies it, the composite master could be printed down on to a positive Ozasol lithoplate. It is perhaps worth stressing that throughout all the processes described the work remains in positive form—an undoubted advantage.

Yours faithfully,

BERYL E. C. TAYLOR,
Translation Section,
Ozalid Company Limited,
Langston Road,
Loughton,
Essex.

12*th October* 1961.

238361

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ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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MEMBERS' ADVERTISEMENTS

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TECHNICAL and scientific translations from Russian, German, and Polish by specialist. B. Klipstein, BSC(HONS), 79 Shipley Fields Road, Shipley, Yorkshire. Tel. Shipley 58215.

TRANSLATIONS into/from Dutch, from German and French. Also scanning/abstracting Common Market publications. Speller-Kuijpers, 5 Stratton Close, Hounslow, Middlesex. Hounslow 6954.

TRANSLATIONS, TECHNICAL, SCIENTIFIC, all languages, by specialists with sound technical and scientific qualifications. J. Smuts, BSC(ENG.), FIL, 12 Thorndene Avenue, London, N11. Tel. Stamford Hill 8564.

WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Technical translation from French and Roumanian. 161 Rivermead Court, London, SW6. Renown 1912.

Appointments vacant

THE BRITISH OXYGEN COMPANY LIMITED, Technical Division, Cricklewood, has vacancy for a technical librarian (male or female) to take charge of and reorganize an expanding technical library. Previous experience in technical library work and an approved Library Association or equivalent qualification desirable. The position is permanent and pensionable and the company offers excellent canteen and other amenities. Commencing salary conditional on age and experience, but will be in the order of £1,000 p.a. Applications with full details of age, qualifications and career to date to Personnel Officer, The British Oxygen Company Limited, North Circular Road, Cricklewood, London NW2.

CHLORIDE ELECTRICAL STORAGE Co. Ltd has a vacancy for a LIBRARIAN (female) to work in a special library serving their group of companies. Her duties will include compilation of bibliographies, classification, and the editing of translations. Special emphasis will be placed on her ability to compile indexes and to abstract intelligently. The successful applicant must have completed part of her training towards the ALA qualifications. Salary according to age and experience. Hours of work 9 a.m. to 5 p.m. Five-day week. Excellent canteen facilities. Applications should be sent to the

Chief Personnel Officer, Exide Works, Clifton Junction, Manchester.

FILM LIBRARIAN, Ministry of Aviation. Pensionable post at Royal Aircraft Establishment, Farnborough, Hants, for man or woman at least 22 on 1st February 1962. Candidates must have passed the Registration Examination of the Library Association or hold London University Diploma in Librarianship. Interest in scientific and technical matters and in film techniques is desirable. Starting salary £645 at 22 to £764 (or, exceptionally, higher) at 25 or over. Scale maximum £1,154. Salary scale under review. Promotion prospects. Write Civil Service Commission, Burlington Gardens, London W1, for application form, quoting 5423/62/14. Closing date 2nd February 1962.

LIBRARIANS (Grade IV) in Government Departments. Five pensionable posts for men and women at least 22 on 1st February 1962 in: *a*, Royal Aircraft Establishment, Farnborough, Hants; *b*, India Office Library, London; *c*, Joint Intelligence Bureau, London; *d*, Ministry of Health, London; *e*, Board of Trade, London. Candidates must have passed the Registration Examination of the Library Association or hold London University Diploma in Librarianship. In addition, for post *a*, interest in scientific and technical matters and in film techniques is desirable. For post *c* knowledge of resources of London libraries and acquaintance with at least two modern foreign languages desirable. Starting salary (Inner London) £700 at age 22 to £819 (or, exceptionally, higher) at 25 or over. Scale maximum £1,214. Salary scale under review. Promotion prospects. Write Civil Service Commission, Burlington Gardens, London W1, for application form, quoting 5423/62/13. Closing date 2nd February 1962.

WOMAN ASSISTANT (age approx. 25) required for staff of *Science Abstracts*. Experience in information work desirable, also working knowledge of scientific and technical periodicals. Progressive post. Pension scheme; five-day week; staff restaurant. Apply, stating age and experience, to Principal Assistant Secretary, The Institute of Electrical Engineers, Savoy Place, London WC2.

Wanted

ELECTRICAL REVIEW, vol. 164 (1959), nos 1, 4, 7, 10, 18, 22, 25, 26. Also *Drug and Cosmetic Industry*, April 1961. Replies to Reckitt & Sons Ltd, Library & Information Service, Dansom Lane, Hull.

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For disposal

BOARD of Trade Journal, bound sets, 1935–54 inclusive. Apply to Commercial Information Officer, Smith & Nephew Ltd, Bessemer Road, Welwyn Garden City, Herts.

VARIOUS numbers of journals in all fields of engineering, particularly nuclear engineering; fuel technology; metallurgy; scientific instruments; applied chemistry; automation, management; also *Design, Discovery, Economist, Nature, New Scientist*. Members are invited to send 'wants' lists to Miss E. Bogan, Librarian, GEC Atomic Energy Division, Erith, Kent.

For Sale

TWENTY-TWO volumes of Patent Abridgements covering the metallurgical arts 1937 to 1950. £6. D. Farrow, BISRA, 11 Park Lane, W1.

SHELL

SHELL INTERNATIONAL PETROLEUM COMPANY LIMITED

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incorporating Aslib Information

How do we classify?

R. MOSS

Some minor By-products of Research

C. W. HANSON

010.5
AS52 Proc

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 February 1962 Number 2

ASLIB CALENDAR

February

WED.21. Winter meeting at Aslib. C. W. Hanson on current research outside Aslib.

THUR.22 – FRI.23. Course on handling technical reports.

WED.28. Economics Group visit to Aslib, 3 p.m.

March

THUR.1. Evening course on practical classification begins.

THUR.8 – FRI.9. Course on photographic copying for the information department.

WED.14. Electronics Group visit to DSIR Radio Research Station, Slough.

THUR.16. Technical Translation Group meeting at Aslib on Scandinavian languages.

THUR.16 – FRI.17. Scottish Branch conference at Perth.

TUE.20. Fuel and Power Group 'Hobby-horse' evening.

THUR.22. Conference on sources of information on the Common Market at the Connaught Rooms.

MON.26. Winter meeting at Aslib. Film show.

TUE.27. Course on 'Information on a shoestring' for part-time information workers.

April

FRI.13 – SUN.15. Aeronautical Group conference at the College of Aeronautics, Cranfield.

MON.30. Winter meeting. 'Every librarian his own salesman' by Eric Simons.

May

TUE.15. Fuel and Power Group Annual General Meeting.

Winter Meeting

The meeting to be held at 5.30 for 6 p.m. on Monday 26th March at Aslib will take the form of a one-and-a-half hour film show. The films selected include one on mechanized information, produced by the Armed Services Technical Information Agency (ASTIA) of the United States, and a twenty-minute film entitled *Just an idea,* intended to encourage industrial organizations to employ information officers.

Scottish Branch

The programme for the two-day residential conference on writing, publishing, binding, and storage of literature, to be held on 16th and 17th March at Perth, includes talks by Mr A. Clow of the Science unit, BBC on 'Writing the literature of science'; Mr G. H. N. Beck of *Endeavour* on preparing scientific material for the press; Mr D. Ainslie Thin of Oliver & Boyd, on publishing; Mr D. Moncur of Dunn & Wilson, on recent developments in bookbinding; and Dr D. J. Urquhart of the National Lending Library, on foreign publications: availability and translations. Mr Moncur will illustrate his talk with coloured slides. The conference will end at lunch time on Saturday 17th March, but it is hoped to arrange a coach tour in the afternoon to include a visit to Innerpeffray Library, one of the oldest in Scotland. The fee for the course will be 3 guineas exclusive of the coach tour. Full details are available from the Branch Secretary, H. Greenshields, 27 Sweyn Road, Thurso, Caithness.

Aeronautical Group

A successful winter meeting was held on 22nd November 1961 when about sixty members and guests visited the Technical Information and Libraries Section of the Ministry of Information in the morning, and heard an interesting talk by Mr Julian Blackwell of Blackwell's, Oxford, in the afternoon.

The short course on documentation for guided missiles and aircraft engineering held from 9th to 11th January at the College of Aeronautics, Cranfield, was attended by twenty-one students.

The programme for the annual conference, to be held from 13th to 15th April at the College of Aeronautics, is now complete. The Group will be joined by the Research, Special, and Information Section of the Library Association for the opening session–which will be addressed by Mr R. L. Collison, BBC Librarian–and for the final session which will be a visit to the Aslib Cranfield Research Project. During the conference papers will be given by members of the Hawker Siddeley Group on 'an assessment of information services'; by Mr S. C. Dunn on 'guided weapons guidance systems'; by Mr M. Verhoef on research work carried out at the Delft technical high school; and by Mr J. L. Jolley and Mr B. C. Vickery on machines for information retrieval. The Annual General Meeting will be held in the afternoon of Saturday 14th April.

Electronics Group

In December 1961 the Group published a *Union list of periodicals on electronics and related subjects* compiled by Miss R. England, B.SC., M.I.INF.SC., of the Plessey

Company Ltd. Some 1,400 periodicals are listed in alphabetical sequence with abbreviated names of holders, up to ten locations being supplied for some titles. The list comprises sixty-four duplicated pages with paper covers, stab-stitched, and is available to members of the Group, price 10*s*, from the Group Secretary, Miss B. Newman, Research Librarian, Ericsson Telephones Limited, Beeston, Nottingham. A limited number of extra copies will be available for purchase by non-members at 15*s*. Cheques and postal orders should be made payable to Aslib Electronics Group.

Index to Theses, Volume 10

In December 1961 the tenth volume of *Index to theses accepted for higher degrees in the universities of Great Britain and Ireland* was published. It covers the academic year 1959–60 and contains author and title entries of 3,195 theses arranged, as usual, by subject and indexed by author and subject heading. Information on the availability of theses according to the rules obtaining at the various universities is given in the editorial note. *Index to Theses*, volume 10 is available from Aslib price 21*s* to members, 25*s* to non-members. It has already been issued to those who have placed standing orders.

United Nations Conference Papers

A conference on the Application of Science and Technology for the Benefit of the Less Developed Areas will be organized by the United Nations in the spring of 1963. It is hoped that the United Kingdom will play an active part in the conference and that Aslib members may make a contribution. Interested experts are invited to submit papers. The subjects of closest interest to Aslib members fall within sections I, Scientific and technological policies; J, International co-operation and problems of transfer and adaptation; and K, Training of scientific and technical personnel.

Attention is directed specially to the following subheadings:

I.2. *Research programmes and economic development policies.*
  I.2.2. Improved methods for the utilization of research results.
J.1. *Methods for stimulating technological change.*
  J.1.2. Application of new techniques of communication to broaden participation in scientific and technological development.
J.2. *Techniques of diffusing scientific and technological knowledge.*
  J.2.1. Scientific and technological documentation including the problems of language and terminology.
  J.2.2. The introduction of standards, norms, and terminology.
K.1. *Planning policies for the acceleration of the development of scientific and technological cadres.*
  K.1.1. Forecasting the requirements and priorities of numbers and types of scientists and technologists.
  K.1.2. Specialized training as a means of accelerating the formation of scientific and technological cadres, including teaching staffs.

K.2. *The programming of science and technology within the educational structure.*
- K.2.3. Specialized programming for training at technical schools, higher technical institutes, and universities.
- K.2.4. Techniques of communication as technological tools of education to meet the specific problems of developing countries.
- K.2.5. Exchange techniques within the framework of the educational programme.

Any Aslib member wishing to submit a paper should contact the Director, Aslib, immediately on receipt of this notice. First drafts of papers will be required by the beginning of May 1962.

Textbook on Indexing

Indexing books: a manual of basic principles is the title of Mr R. L. Collison's latest contribution to the literature of indexing. In it he has attempted to provide a textbook for the learner and, as the title suggests, has restricted the scope of the work to indexing of books only. A wealth of examples and exercises is included which should be valuable to the student. Mr Collison is a founder member of the Society of Indexers which has done much to foster the craft. *Indexing books* is published by Ernest Benn Ltd, Bouverie House, 154 Fleet Street, London EC4, price 8*s* 6*d*.

Bibliography of Directories

The fourth edition of G. P. Henderson's *Current British directories* has recently been published. The section on local directories has been reorganized and supplied with a special index of places. There follow the familiar section on specialized directories, giving full annotations on their contents, and two new sections giving select lists of international and Commonwealth directories respectively. The full index, in conjunction with the annotations, enables an inquirer to find easily those directories which will be most useful to him. This remains the standard reference book on British directories and the additions have augmented its value. *Current British directories* is published by Jones & Evans Bookshop Ltd, 70 Queen Victoria Street, London EC4, price 45*s*.

Spanish and Portuguese Technical Dictionaries

Canning House Library Bulletin, no. 48, February 1962, will contain a full list of the Spanish and Portuguese technical dictionaries held in the library. The collection amounts to some 120 dictionaries.

A limited number of copies of this issue of the Bulletin will be available, free of charge, to Aslib members. Application should be made to G. H. Green, Librarian and Information Officer, The Hispanic and Luso-Brazilian Councils, Canning House Library, 2 Belgrave Square, London, SW1.

Current Contents and *Index Chemicus*

The Institute for Scientific Information in Philadelphia have announced that a special arrangement has been made to speed up delivery of *Current Contents* to subscribers in Europe; by this arrangement copies are flown to Amsterdam and are forwarded from there by surface mail. The Institute has offered to send sample copies of the Life Sciences and Space Sciences editions of *Current Contents* and of *Index Chemicus* to any Aslib member. Requests should be sent to the Institute for Scientific Information, 33 South 17th Street, Philadelphia 3, Pa, USA.

Information Retrieval in Action

A conference entitled 'Information Retrieval in Action' will be held from Wednesday 18th to Friday 20th April in Cleveland, Ohio, under the auspices of the Center for Documentation and Communication Research of the School of Library Science, Western Reserve University. The conference will review research, development, and operational activities relating to machine literature searching systems using the GE 225* general-purpose computer. Experience in the literature of metallurgy, education research, diabetes, and communicable diseases will be included. Among the guest speakers will be Mr Cyril Cleverdon, Director of the Aslib Cranfield Research Project, and Mr Robert Fairthorne of the Royal Aircraft Establishment, Farnborough.

Registration fee for the conference is $10 (72*s* approx.). Further information and a full conference programme may be obtained from the Center for Documentation and Communication Research, Western Reserve University, 10831 Magnolia Drive, Cleveland 6, Ohio, USA.

Information Processing Conference

The International Federation of Information Processing Societies will hold a conference from Monday 27th August to Saturday 1st September in Munich. Subjects to be dealt with cover various aspects of information processing and digital computers, including translation and linguistic analysis, and information recording and retrieval. Further information may be obtained from Dr A. P. Speiser, Secretary-Treasurer, International Federation of Information Processing Societies, IBM Research Laboratory, Zürichstrasse 108, Adliswil, Zürich, Switzerland.

The Federation recently announced the formation of a Standards Sub-Committee on Terminology and Symbols under the chairmanship of Mr G. C. Tootill of the Royal Aircraft Establishment, UK. The object of the sub-committee is to standardize terminology of digital computers and data-processing equipment and to promote exchange of information leading to compilation of a multilingual glossary for information processing systems.

Durability of Catalogue Cards

A recent investigation carried out by the Library Technology Project of the American Library Association has shown that 100 per cent rag stock is not necessarily the most durable material for catalogue cards. While first quality 100 per cent cotton stock of low acid content produced the most durable permanent card, some other 100 per cent cotton stock proved inferior to strong chemical wood fibre stock and stock of 50 per cent cotton content. The full report of the investigation is published under the title *Permanence and durability of library catalog cards,* LTP publication number 3, available from the American Library Association, 50 East Huron Street, Chicago 11, Illinois, price $1 (7*s* 3*d* approx.).

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* Manufactured by the General Electric Company of America.

CIDESA

The International Centre for African Social and Economic Documentation (CIDESA) was set up in January 1961 at the instigation of the Centre belge de documentation economique et sociale africaine (CEDESA). It has already published a set of 1,500 bibliographical index cards, with abstracts, on African economics and sociology and a further edition is planned for 1962.

Membership of CIDESA is available to organizations only, but individual members of Aslib may buy the index cards at a special 10 per cent reduction. Further information and details of membership may be obtained from CIDESA, 42 rue de Commerce, Brussels.

HOW DO WE CLASSIFY?

R. MOSS

THIS article is based on a talk originally given to the Northern Classification Study Group in January 1960 as one of a series of introductory discussions held by the Group, to whom I am indebted for permission to publish it. The opinions presented are my own and do not necessarily represent those of the Group.

The paper contains a brief summary of classification from the points of view of:

1. classifier—in the Bliss terminology, one who draws up a classification—of whom, if we restrict ourselves to the general schemes, there are not many;
2. classer, again per Bliss, the one who applies an existing schedule to incoming literature and,
3. user, customer, or reader whom everybody claims as his own.

I have chosen this approach because it seems to me that, in recent years, the simpler everyday routine practice of classification has tended to be forgotten in the search for an ideal theoretical basis.

CLASSIFIER

In practice, most accept or adapt one of the major schemes. Those who make their own scheme are usually working in much more restricted fields than those of the 'general knowledge' major schemes. Sometimes, studying these schemes, one wonders whether the whole idea of classification is not as cranky as the simplified spelling of the Dewey introduction. The Library of Congress tables contain almost as many split personalities in the shape of multiple placing of the same subject as any other scheme—if you do not believe me, follow the several placings of 'bricks' in class T. The UDC has failed to give an international library language. It is no discredit to Bliss to say that the practical applications of his thought do not live up to the intellectual promise of his theory of organization. I must leave it to those who know more about these things than I do to comment on Colon.

My own opinion is that the limitations imposed by any practicable notation are so great that no scheme since devised represents any administrative—or even intellectual—advance over the original Dewey decimal idea. This is not to represent Dewey as an ideal but rather to act as a reminder that only a small part of knowledge can be adequately recorded in print and that any classifier must, whether he likes it or not, work within certain fairly restricted limits. Historically, library classification is associated with the arrangement of books shelved in the open-access library. It is not solely accidental that the first scheme to gain widespread acceptance (Dewey) came into being when education, becoming compulsory, was, at its higher levels, being rapidly divided into faculties and special subject schools. Until then, the educated man had little need of subject catalogues. His training was still mainly classical and his approach to literature revolved around the classical authors.

It is, of course, in the best traditions of Parkinson's Law that the most grandiose establishments are raised when they are long past the peak of their usefulness. Regard, therefore, how library classification came into prominence as a means of filing books just about the time when the book was ceasing to be the main vehicle of educational advance—when, in fact, and especially so far as the immediate record and reporting of scientific progress was concerned, the book was being superseded by the journal, which is itself in turn being superseded by the research report. These two forms of literature comprise the bulk of the material in industrial libraries today; their filing sequence—being serial—is independent of classification.

Library classification involves allocating some numerical or quasi-numerical sequence to books lined up on shelves in visible display. Without this display, any classification must be inadequate; nor do the orthodox card indexes which serve as ancillary or subsidiary classifications provide a very effective form of rapid display.

I do not wish to enter here into the controversy between librarian and subject specialist, information scientist, intelligence officer, or whatever he is called, but I side with the specialist enough to say that before you can draw up a classification scheme, or even apply one, *some* knowledge of the subject is necessary. In many cases, perhaps even the majority of cases, it need be no more than ability to recognise the terms of reference; in others, a much higher level is necessary. One has not only to recognize terms of reference; one has also to recognize their equivalents and, still more, to recognize when the terms of reference are being employed in situations not relevant to the classification problem in hand at the moment. Thus, I do not agree with those who argue that classification is entirely a matter of library technique; nor with those who look only to subject knowledge and overlook the limitation which the only techniques so far available must place on the subject approach. For both schools of thought the limitations of words and language in providing description, definition or reference to the external world and to sense experience must mean that any practical classification scheme can be only a compromise between these several factors. Above all, there is the problem that knowledge is not static. It is not only the sciences which change and progress—arts subjects are even more subject to the vagaries of interpretation. 'Every generation rewrites its own history'—and this with a comparatively static collection of fact over which there is little argument.

As knowledge changes and develops, the classifier must allocate some corresponding numbers to new subjects. This means either looking for unused numbers or lengthening existing ones, and in the long run we are restricted to the latter. With an established schedule and notation, and especially with one which contains a fair amount of detail already, any change becomes difficult to fit in. A notation does not, as is sometimes claimed, 'mechanize' the schedules. If we must have analogies, rather it freezes them and, in practice, expansion of a classification becomes a matter of searching for convenient holes in the ice in which to fix new subjects. Indeed, once the base of a classification has been completed no expansion is possible. You can only intensify detail. This additional detail involves long and, to a large extent, arbitrary numbers (including other symbols acting as numbers). The height of absurdity is reached when the class number becomes longer than the word it represents. For example, the UDC number for 'Magnetron' is 621.396.615.141.2—i.e. thirteen digits and four full stops. The great weakness of library classification has always been that the more recent the subject, the longer the number. This, of course, is the exact opposite of what is wanted.

PRACTICE AND IDEALS

In practice then, classification, in the library sense, can refer to at least four different situations. These relate to logic, word order in schedules, indexing and filing sequence.

Logic

Although it is not the same as classification in the logical sense, it cannot be completely divorced from it. It is pointed out at a very early stage in textbooks on classification that it is the words and not the numbers which classify, and any elementary textbook on logic will confirm this.*† Practical evidence of this in library classification is provided by the so-called 'Dictionary' catalogue which has the same purpose and achieves the same result as a classified one. So does 'Uniterm'. The differences between these various methods are not of classification but of filing and display.

Word order

The subject arrangement of classification schedules is founded upon the ordering of selected words in some pre-arranged scale of values or priorities—'Hierarchy' in the overworked jargon term applied to the schedules. Unfortunately, we do not have a separate and immediately identifiable vocabulary for this hierarchy. It can be expressed only by giving emphasis or priority to selected words removed from their context. In the interpretation of these words each of us has his own scale of values and opinions.

Indexing

An examination of the majority of the terms in a detailed schedule and of the index to these schedules will show that these differ from the indexing terms in a book or journal only inasmuch as the location given is that of schedule numbers instead of page numbers.

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* WOLF, A. *Textbook of logic.* 'Every name expresses the recognition of a class of objects.' p. 170.

† RUSSELL, B. *Human knowledge: its scope and limits.* 'When we come to knowledge expressed in words, we seem inevitably to lose something of the particularity of the experience that we seek to describe, since all words classify. But there is an important point that needs to be emphasized: although, in a sense, words classify, the person who uses them need not be doing so.' p. 441.

Filing sequence

There is finally the allocation of filing numbers or quasi-numbers for books in a subject arrangement on a shelf or for cards in similar arrangement representing books or other documents.

As well as the four practical situations there are at least three theoretically ideal functions.

1. Translation into an artificial number gives, in theory, an international coding language. This should enable a reader to enter any library anywhere and find the same subject in, relatively, the same place. This was, of course, one of the reasons for the foundation of UDC and it is significant that UDC began in one of the linguistic battlegrounds of Europe—Belgium. It is also the reason for the importance attached to classification in Indian libraries where they have to cope with many languages and several alphabets.

Similarly, one reason why classification has met with little response in the USA is, I think, that there is a more than adequate quantity of literature in the home-grown language.

2. There is the mnemonic value given by class numbers which are a form of shorthand for the subjects they represent. Nowadays, this advantage is non-existent. In UDC, for example, many numbers are already longer than the words they represent and a slight typing or filing error can confuse 669.822 (Uranium) with 669.882 (Potassium).

3. Universal (we can no longer use this term; at best it must be International) schemes offer the administrative advantage of centralized classification, provided everyone surrenders their own choice of shelf sequence. This is possible as far as openly published literature is concerned, but the bulk of literature in industrial libraries is increasingly report material which is restricted for commercial or military reasons. To this, centralized schemes—other than those within the particular company or department—are not applicable.

CLASSER

I come now to the work of the 'classer' in applying given schedules to incoming literature. We may assume that the principle on which he acts is that of bringing like material together in the order in which the schedules bring it together. However, things can be like in many ways; 'like' in this context can only mean areas of similarity and not points of accuracy. It is a mistake to seek precision in classification. Also, every bringing of like material together, whether the placing of a book on a shelf or the insertion of a card in a catalogue, involves the separation of what was previously 'like'; with the passage of time things which were once adjacent may become quite widely separate. There is also the point that bringing like together in an established library means following your predecessors' mistakes.

In practice, classification involves the comparison of the printed words of an incoming document with the word order of the schedules. If the job is to be done properly it also involves a comparison with what is on the shelves or is in the catalogues. In cases where there is little doubt about the placing, this often gets ignored—time saved on the easier placings can be better spent on the trickier ones. The flood of literature pouring out today, never gives adequate time for each document and, as with everything else, our carefully thought-out organization of knowledge boils down to a race against the in-tray.

Basically, there are three possible situations for a classer in dealing with his material. In the first, the title* summarizes the contents of the book adequately and is also contained in the schedules. I include in this first case those occasions when the title is not contained in the schedules but can be equated well enough with a word or phrase that is.

At the opposite extreme is the situation where the subject matter of the work being classed is so involved that we know nothing about it.†

This brings us to the third case, the one which is *the* classification (classing) problem, the intermediate situation ranging over the whole vast field between these two opposites.

Let us now consider for a moment the sequence of operations in the activity of classing. The problem first resolves itself into reading the document. It is not very long before the classer discovers he never has time to do this. He is reduced, therefore, to scanning the work and to concentrating his attention on index, chapter headings, contents list, abstract, title page or publishers' 'blurb' in an effort to find out what the work is 'about'. Assuming that he can understand—or at any rate identify—something of what he reads, he has to try and summarize the whole document—which in the case of some weighty tomes may be not far short of a quarter of a million words—in one, two or three (occasionally more) words. This is asking the impossible. What happens is that he must select some recurrent or dominant terms and choose one (or perhaps several if he is reconciled to multiple indexing). He has then to find whether the words selected, or something generally acknowledged to be a reasonable equivalent of them, occur in the schedules; inevitably, his eventual choice of terms must be dictated or at least heavily weighted by what he can find there. It would be almost impossible for this sort of bias not to creep in. I should think that most classers have known the situation where they are forced to classify by first eliminating 'what it is not'—a trial and error method to reduce the area of uncertainty to more manageable proportions.

I wish now to consider briefly the special circumstances of classing in the small industrial research library with which most of us are concerned. Here, in spite of the small stock, we need to classify a wider variety of documents than is usual in the general library for which classification techniques were designed.

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* We are told—rightly—never to classify by title alone. Unfortunately, in a desperate desire to be profound, this is interpreted as 'classify by anything but title' with the result that books and documents are found in any place but the obvious.

† It is worth noting that the most abstruse subject can, in practice, be classed if the schedules are simple and contain few classes. In a scheme as simple as, say, division between 'Arts' and 'Science' most books would fall fairly easily into one or the other. For those that did not, use Dr Gallop's biggest class—'Don't know'. This is the greatest invention yet in classification. It should be compulsory in every scheme.

The problems raised by simple classification schedules are that in any average library collection, unmanageable quantities of books or documents would appear in some class. In general, the simpler the classification, the fewer will be the marginal cases where decisions in placing as between alternative classes have to be made. It is these marginal decisions which take the time in practical work and which have to be reduced to a minimum.

We have a comparatively small collection of books, most of them within the narrow ranges of our technical interest, with perhaps a few reference works of wider scope. There is a rather larger collection of periodicals whose scope is fairly exhaustive of the 'main' subject within which our particular speciality lies and there is finally—or ought to be—a fairly complete collection of the reports issued by our laboratory and its associated companies. I will have to ignore the numerous miscellaneous pamphlets, trade catalogues, reprints and correspondence which flood on to our desks. Any library which still continues to treat these by classification and cataloguing routines is wasting its time.

It is fairly safe to say that most libraries have found it practically impossible also to get relevant references to the three main types of literature—books, periodicals, reports—in one catalogue or index. By dint of cramping all your books within one or two 'main' classes and subdivisions of the notation and having unused thousands of numbers on either side you manage to classify your bookstock. Periodicals as a whole defy intensive classification. Non-analytical classification of periodicals means that they are dumped together under the appropriate number for 'Chemistry', 'Metallurgy', or 'Polymers'. Analytical classification—separate classing or indexing—of all the articles within a collection of periodicals is practically impossible. At best, a selection of what appear to be the more important ones must be made. But it is not only quantity that deters us, there is the 'quality'—by which, in this context, I mean the subject content—as well.

From the subject point of view, one can consider separate periodical articles and technical reports together. The latter are of about the same length, style and format and with only a slightly greater intensification in detail than the periodical article. Indeed, not a few periodical articles begin life as technical reports. By the time you get down to this level of classing and indexing you are, in effect, dealing with a piece of literature which amounts at most, to a specific chapter of a highly technical book. You are trying to classify not only the subject of a book but the relevant parts of its contents list and index as well. In short, using orthodox schemes in the special library, you find very quickly that there is excessive detail outside your own speciality and nothing like enough inside it; and classing can be done, if at all, only by the use of absurdly long numbers. One would have thought that if people are determined to use existing schemes, they would have done some experimenting with shortened notations obtained by spreading the existing notations over the few classes they will use. This means abandoning all those classes which will never be used in a specialized library. This is not a loss. To retain them is a dead weight which should never be carried. There is also no denying that at this stage, classing a scientific report, knowledge of the subject is all-important. Without this, the classer is reduced to crying 'snap' on being lucky enough to see the same terms in some places of both the report and the schedules.

Among the difficulties facing the classer are those of ambiguities in the classification, that is, the occurrence of the same subject at different places and with different class numbers in the classification. Whatever historical reasons there may have been for the derivation of these different numbers, their presence now is irritating to the classer and baffling to the customers. In my opinion, there is only one answer to this for a special library and that is to select one of the alternative placings and stick to it. This is far preferable to the interminable arguments as to what, for example, is 'metallurgy' and what is 'workshop practice', and to the other alternative, the uneconomic practice of giving to one subject as many numbers as the classification provides, with its consequent clerical problems of multiple production and filing of cards. Similarly, apart from those places in which the schedules offer alternative placings and give no guidance as to which to choose, few books relate to one and one only of the classes even in simplest schedules.

I have often heard it said that a title index of reports is inadequate in a technical library. It is, as regards the real information—the scientific content—but it certainly is not as regards indicating relevant or likely reports, which I submit is the library function. Report titles are generally more useful than those of books, where the publisher must think of something with a sales appeal. I am convinced that a great many of the UDC and other numbers which are provided on millions of cards in technical libraries up and down the country, and which look so erudite, are, in fact, no more than cards transliterating titles, with occasionally similar transliteration of a few randomly chosen words from the abstracts as well. In practice, classification is done at a very elementary level and is made to look profound by excessive notation. We are, in effect, already largely using title indexing and complicating it unnecessarily by magic numbers.

Again, if classification is not to be done simply—that is at the level of title or contents list—how are we to obtain the time to read all that we classify? Even supposing there is time, why pretend that we can understand and transpose into class numbers all we can read. The subject specialist can—perhaps—but there are few libraries even in these days of intensive specialization where the literature is restricted only to one person's particular speciality. Most libraries cannot afford to have a specialist for each of the subjects with which they deal. In practice, we are going to get our classing done now, and in the foreseeable future, by people with inadequate knowledge with not enough time.

CUSTOMER

Although we pay lip-service to the adage, 'Classify for use', I doubt whether the customer in fact gets much of a look-in. A classer struggling with the jargon of a report and the ambiguities of a schedule is not likely to take kindly to any suggestion that the place he has chosen is very select but that the customer is unlikely to look for it there. A user's approach to the catalogue is influenced and conditioned by his education, training and specialization. His purpose at the moment may range from 'browsing', through literature searching and fact finding to last-minute examination cramming. In the research library, it is almost inevitable that the classer knows less than the customer. The customer may approach with a blank mind, but rarely an open one.

What is the situation which faces the user who wishes to find information by subject rather than by author or serial number? We may assume that he is not interested in library and information techniques and not aware of the endless trouble to which people have gone to raise this invisible barrier between him and his information. He wants relevant information rapidly. He is accustomed to seeing books on display in a booksellers under easily understood labels such as 'Physics' or 'Economics' and wonders why things cannot be as simple as this in a library. To him, lengthy and involved notation is irritating and pointless. For him, the class number is, in fact, fulfilling only the same function as the grid reference numbers on a map or the page numbers of a book. To be successful in the user's hands, it must have something of the same regularity and simplicity. The regular customer in a library probably ignores the classification altogether and relies on his memory of the geography of the library to fix the location of his subjects on the shelves. I recall one eminent reader in Electrical Engineering who insisted that the 'right' place for everything electrical from alternators to X-band was in 'Networks'. The 'Network' shelf was 6 ft. high—so was he.

Supposing, however, that the user does go from the index to the classified file. (And this is assuming that the terms by which he symbolizes a subject are the same as those in the index and that he has found a corresponding number.) He has to memorize or probably to note the number. He has to locate the drawer which includes this number in the classified file and he has then to compare and finally equate the noted number with the corresponding cards of the file; all this time, standing at a catalogue thumbing through a series of cards, probably inadequately guided, in which each hides the next, thus depriving them of what is the unspoken assumption of classification—rapid visual scanning. He has then to go to the shelves with a fair chance of the item he requires being out already. If he finds nothing he must return to the counter and ask what has happened to so-and-so which is at 'Six two one point three point seven nine six point two eight colon five four three stroke five four five colon five four one point one five'. This is no more exaggerated than the average UDC number in a technical library and is much less fearsome than some of the notations being advocated now. This problem of length of notation is crucial if we are to retain classified files in which the customer can carry out his own searches, and it is only a little less crucial for the classers if we are not to have their time and energies wasted on conscious or sub-conscious memorizing of unfamiliar symbols.

A paper published some time ago on numbers for the GPO Nation Wide Subscriber Dialling is very relevant to this problem. With this dialling scheme, each subscriber throughout the country must have an unique telephone number; with subscribers running into millions each new national number will, therefore, be 8, 9 or 10 digits in length. Some research has been carried out to find out how good people are at remembering or even correctly recording these comparatively lengthy numbers. The results do not seem too encouraging: 'it is almost certain that with longer numbers the chance of errors of these kinds increases, out of all proportion in the increase of the number of digits'.* There was difficulty in using even eight digit numbers. Also, these tests were carried out with GPO staff who could be expected to be more familiar with the problems of memorizing and recording telephone numbers than the general public.

The situation is entirely comparable with classification numbers. Once we get numbers having as many as eight digits not only are the chances of error greatly increased but they are also most inconvenient for the users. If we accept this psychological limitation to eight to ten digit numbers as correct, it is apparent that there is little prospect of drawing up a detailed universal scheme again; we have to accept that we shall have to draw up separate schemes for each speciality and also that the notation used will duplicate that used elsewhere in other special schedules. Most of the special subject schedules drawn up recently do in fact use a complete numerical or alphabetical basis for their speciality. It is this use of a complete base for the comparatively small (small, that is, in comparison with a general classification) number of class numbers which gives a short and neat notation and not the particular method or technique of classification as many seem to claim.

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* *Post Office Telecommunications Journal*, vol.10, no.1, Autumn 1957, p. 37–9.

It is worth noting that Vickery has written that 'a system which will be mainly used for specific searches may well take an alphabetical form'.* In my opinion all literature searches in industrial libraries are 'specific', i.e. highly specialized. Coming from this writer the significance of this statement has not received the attention it deserves.

CONCLUSION

The first problem of classification is that which has been argued by philosophers throughout the history of the Western World. It is the problem of relating words to sense experience and to human communication. The earliest statement of the problem—and perhaps still the best—can be found in the famous discussion on 'forms' in Plato's *Republic*. The arguments about the answer are called Philosophy. It is unlikely that classifiers will be any more successful than the philosophers in finding a solution and we have the added pleasant complication that we have also to fit the unknowable into a filing system.

In the library world classification has come to be misinterpreted as a method whereby, if the right order can be found, every existing and potential indexing term can be translated into a quasi-numerical sequence displaying an ideal order of knowledge. I cannot credit however, that this situation of translating every known name, noun or term into an artificial number can continue especially when, with the documents we now handle—journals and reports—there is no need for it.

We should remember that it is only since the natural sciences ceased to concern themselves with 'universals' and began to concentrate on small sections of knowledge that they have begun to make the remarkable progress of recent centuries. No library 'universal' classification schedules or techniques can cope with the vast bulk of modern printed knowledge and we must face the change from universal or general schemes to much simpler ones which would be in fact no more than *aides-mémoires* for the much more limited fields in which most industrial libraries specialize. Also, we cannot, as yet, construct schemes for indefinite periods. We have rather to contemplate remaking these, not only every generation, but as frequently as every five or six years. Moreover, the total number of classes in a schedule should be kept as small as possible for only when a classification scheme is compact enough for a classer to know every location or class can that scheme be effective.

* VICKERY, B. C. *Classification and indexing in science*. 2nd ed. 1959, p. 110.

We should cease to regard classification as a method of placing documents in the most 'specific' place for all time, but rather as a continuous process of revision resulting in further division of a class only when the number of documents in that class is becoming too great for convenient administration or location.

In circumstances where notation is essential, we need to decide at an early stage whether we wish to employ notations simple enough to be used by the readers—in which case it is likely that the number of terms and classes which can be used in any one scheme will be very limited—or whether we are effectively to restrict their use to the classers, accepting that any schedules which can contain an adequate number of classes and terms will be so complicated that it will be very unlikely that the reader will be able to use them without extensive help. An attractive proposition from the point of view of 'empire-building', perhaps, but will the staffing position in industrial libraries ever allow this?

SOME MINOR BY-PRODUCTS OF RESEARCH

C. W. HANSON

Some miscellaneous minor by-products of Aslib investigations are given in the following notes in the hope that they may be useful to readers.

NUMBER OF DAYS DOCUMENTS ARE KEPT BY BORROWING LIBRARY

The information summarized below may be useful to librarians when they are considering rules covering the period of loan allowed. They show the periods for which, in practice, borrowed documents were kept.

Table 1 gives the times for which a representative sample, numbering seventy-six, of special libraries, kept 1,635 documents borrowed by them from other libraries during a specified period in 1960. The times given are *working* days, Saturdays, Sundays and public holidays being excluded. No account is taken of the loan period formally allowed by the lending libraries, nor of any extensions granted.

TABLE I

Number of working days borrowed documents kept

WORKING DAYS KEPT	1–5	6–10	11–15	16–20	21–25	26–30	>30
% of periodicals	24.8	28.6	23.6	13.2	6.6	1.9	1.3
% of books	18.6	25.1	21.4	15.8	15.4	1.6	2.0
% of total	23.9	28.0	23.3	13.6	7.9	1.8	1.5

'Periodicals', which formed 85 per cent of the total documents, included reports and pamphlets.

LENGTHS OF TECHNICAL PAPERS

When making estimates of the volume and cost of photocopying, microfilming, translating, etc., it is useful to have some idea of the lengths of periodical articles. Figure 1 provides information on this point for articles in foreign language periodicals. It is derived from an analysis of 1,020 papers of more than one and less than thirty pages which was made in connection with an investigation of the Commonwealth Translation Index.

The arithmetic average was 7.5 pages. The median was six pages. The mode (the most common figure) was four pages. Data derived from a different source (263 photocopies ordered consecutively by Aslib, irrespective of language) gave arithmetic average 9.7 pages, median eight pages, and mode three pages. These papers included thirteen of one page and eight of over thirty pages.

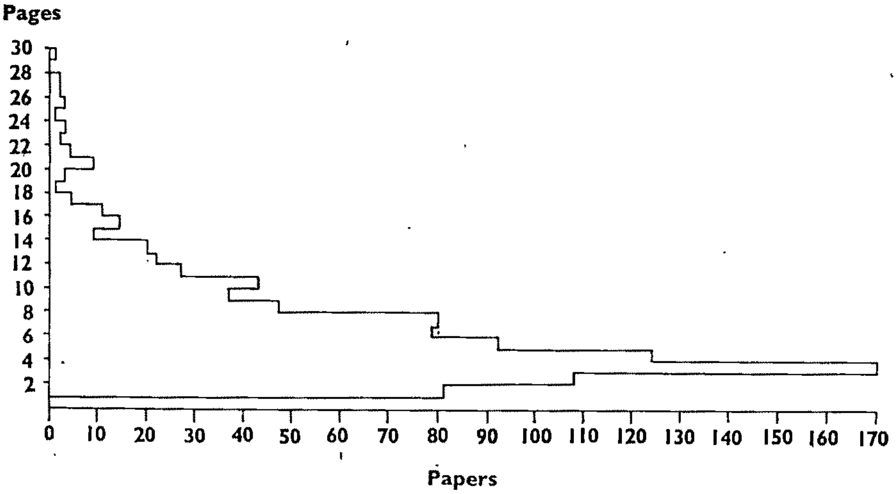

FIGURE 1. *Distribution of* 1,020 *papers according to number of pages*

COST OF MATERIALS FOR PACKING PARCELS OF DOCUMENTS

Libraries can of course work out for themselves easily enough the average cost of the materials they use in packing documents for the post — but in practice few of them appear to know how much this minor item costs them.

The Science Museum Library was good enough to supply Aslib with some data derived from their own records. An average of 1.55 items was dispatched in any one parcel. The cost of packing materials—wrapping paper, corrugated, string, etc., averaged 3.99*d* per parcel, or 2.75*d* per item. The figures relate to 1960, and to new, not re-used, materials. They do not include cost of labour.

BOOK INDEXES AS TIME-SAVERS

How much is an index worth to the readers of a book? Twenty-two books on the subject of technical writing drawn from the Aslib library were consulted by the Research Department secretary to find any passages about the use of footnotes in technical reports. Eight books on electrical instruments were consulted in the Patent Office Library by the head of the department to find any passages about galvanometer suspensions. All the books had indexes. Two searches were made in each book. First, indexes were ignored and the search was made via contents pages, chapter headings, sub-headings, etc., as would have had to be done had there been no index or no relevant entry. The time to find the right place, in both groups of books, averaged about seven minutes, and ranged from one to twenty minutes. The indexes were then used and the time to find the right place was found to be almost uniform at about one minute. The use of the indexes saved an average of about six minutes. In addition they sometimes revealed passages additional to those found in the first search.

If each copy of a book is consulted for specific reference purposes ten times on an average during its lifetime, the user saves an hour. If each title averages five hundred users, the total saving is five hundred hours, or about £250 at ten shillings an hour which is the approximate cost of an £850 a year man's working time. Of course this trivial calculation is based on flimsy evidence and crude assumptions; but even so, does it not at least suggest that a good index, although an expense to the publisher, is well worth while to the community of users, and hence should be regarded not as a luxury but as an integral part of a book?

Letter to the Editor

Madam,

It is interesting to read Mr Moss's account of how we classify, because it describes with alarming candour what goes on under the name of classification in far too many special libraries and information departments. Indeed there must be few of us so perfect that we do not feel the accusing finger pointed at ourselves at least part of the time. Nevertheless, while conceding the truth of the picture Mr Moss paints, I cannot agree with his conclusions. To say that many people classify badly because classification is a difficult and demanding task does not mean that good classification is not worth the effort. Good classification is not a matter of matching words in the title or abstract with words in the tables, but of defining the relevant information in the document under consideration and placing it where it fits into the map of knowledge laid out in the schedules, so that it will be found in answer to any inquiry to which it may be relevant. The fact that the UDC number for a magnetron is longer than the word is not important; even the difficulties of users handling unfamiliar numbers may be compensated by the provision of more complete information.

The structure of scientific knowledge is complicated and can only be adequately represented by a complicated scheme. The compensation for the difficulties comes when one is presented, in a search, with more information than one could have dreamed existed in the system, and this can happen with a well-designed classification. Mr Moss has, however, put his finger on a real difficulty and shown up an area for possible search. One would like to see an investigation of the relationship between the amount of effort expended on the input of information in to a system and the time saved in finding answers to inquiries; this, not in terms of a mechanized system, but of a humble librarian using a traditional system on a very restricted budget.

Yours,

JACK BIRD,

Aslib.

January 1962.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Technical translation from French and Roumanian. 161 Rivermead Court, London, SW6. Renown 1912.

Appointments vacant

BRITISH HYDROMECHANICS RESEARCH ASSOCIATION requires an assistant Information Officer. A science graduate with experience in hydromechanics or engineering, and with a flair for technical writing would be preferred. The candidate will be expected to prepare reviews, abstracts, and bibliographies, and assist with indexing, information searches, and answering of technical inquiries. Starting salary depends upon age and qualifications, but will be at least £800 at 25; FSSU; five-day week. There is a good possibility that housing accommodation will be available. Application should be made in writing to the Information Officer, BHRA, South Road, Temple Fields, Harlow, Essex.

CHIEF EXPERIMENTAL OFFICER in the Library of the BUILDING RESEARCH STATION, Department of Scientific and Industrial Research. Pensionable post at Garston, near Watford, Herts, for man or woman at least 35 on 1st March 1962 to develop and supervise the library services and to edit *Building Science Abstracts*. Qualifications: normally degree or HNC (or equivalent) in a scientific or engineering subject. Experience of special library work essential; librarianship qualifications an advantage. Knowledge of French, German, and Russian, and of building and the building industry, desirable. Salary scale £1,976–£2,288. Starting salary may be above minimum. Write to Civil Service Commission, 17 North Audley Street, London W1, for application form, quoting S/5435/62. Closing date 20th March 1962.

DSIR requires Assistant Experimental Officer at National Lending Library for Science and Technology, Boston Spa, Yorkshire, to assist in selecting, issuing, and promoting the use of scientific and technological literature. Qualifications: GCE 'A' level in two science or mathematics subjects; over age 22 pass degree, HNC, or equivalent qualification in science or technology. A knowledge of a foreign language other than French or German, and experience or training in statistics or operational research an advantage. Salary: £458 (age 18)–£645 (age 22)–£801 (age 26)–£983. Application forms obtainable from Director at the above address, quoting NLL.3. Closing date 29th March 1962.

Russian or German linguist for Translation Service of The Iron and Steel Institute. Technical background preferable. Apply by letter to Librarian, 4 Grosvenor Gardens, London SW1.

SCIENTIFIC INFORMATION OFFICERS are required at the ATOMIC ENERGY ESTABLISHMENT, Winfrith, Dorset, to help in the development of the scientific and technical information service whose work is closely linked with the Establishment's research into the future possibilities of various nuclear reactor systems for electrical power generation and ship propulsion. The European Nuclear Energy Agency high temperature reactor experiment 'Dragon' is also being built at the Establishment. These vacancies are for people prepared to work closely with scientists and engineers by providing answers to specific requests and by showing initiative in anticipating their future information needs. The work includes answering technical inquiries, searching the literature, preparing bibliographies and briefs, and abstracting reports. Applicants should preferably have a pass degree but the minimum qualifications are GCE in five subjects including two scientific or mathematical subjects at Advanced level, HNC, or equivalent. Candidates should have a broad interest in science; the ability to read German and/or Russian would be an advantage. Suitable training will be given to successful candidates. Salary £745 (at age 23) to £1,430 per annum according to qualifications and experience. Housing, house purchase assistance, superannuation, and assisted travel schemes. Send *post card* for application form to Personnel Branch (W.459/205), UKAEA, AEE, Winfrith, Dorchester, Dorset, not later than 26th February 1962.

TECHNICAL EDITOR. The Intelligence Department, The British Aluminium Co. Ltd, requires a graduate technical editor to be primarily responsible for editing an abstract bulletin. Knowledge of foreign languages, especially German and French, and previous experience desirable. Apply in writing to the Staff Manager, The BRITISH ALUMINIUM CO. LTD, Norfolk House, St James's Square, London SW1.

Appointments wanted

CHARTERED LIBRARIAN, aged 30, seeks library/information department post in London area. Experienced particularly in librarianship of metallurgy and welding. J. H. Martin, 27 Sumner Place, London SW7.

Wanted

ASLIB PROCEEDINGS, vol.11, no.4, April 1959. Replies to Chief Librarian, Tube Investments Department of Technical Information, Rocky Lane, Aston, Birmingham 6.

Wanted—*continued*

ZEITSCHRIFT fur Anorganische Chemie, Bd 243, 1939—Bd 300, 1959. Quotations to the Librarian, The Andersonian Library, The Royal College of Science and Technology, George Street, Glasgow C1.

ONE copy of *Journal of the Society of Motion Picture Engineers* for July 1949. The Librarian, Ilford Limited, 7–9 Roden Street, Ilford, Essex.

ASSOCIATION for Computing Machinery, *Journal* (1955) vol.2, nos 1, 4, and 5; *IRE Transactions on Antennas and Propagation*, vol.9, no.6; EMI Technical Library, Hayes 3888, ext. 2110.

For disposal

BULLETIN of the Imperial Institute, vol.XLIII, no.1 to vol.XLV, no.3. Castrol Limited, DTI Library, Castrol House, London NW1.

Found

RAILWAY GAZETTE, July–December 1957, bound in green buckram. Apply to Librarian, Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1.

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

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required by
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To perform general library duties and undertake literary searches and the preparation of scientific bibliographies.

The minimum qualification is G.C.E. in five subjects including English language at 'O' level and two mathematical or scientific subjects at 'A' level, or equivalent qualifications.

Applicants without previous experience wishing to make a career in librarianship will be considered for this post. However, the possession of the Associateship of the Library Association, a Pass Degree in a scientific subject or experience in a special library would be an advantage.

The successful applicant will be expected to undertake part-time study for the Library Association examination unless he or she is already qualified.

SALARY:
£495 (age 18)—£860 p.a.(age 26 or over)—£1,055 p.a.

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Please write for application form to the Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks, quoting ref. 3025/205.

Harwell

photographic librarian

We need someone to take charge of the Photographic Library at the Atomic Energy Research Establishment, Harwell.

The Library comprises some 100,000 photographic items—negatives, lantern slides and prints—and this figure increases yearly by some 15,000 items.

Applicants should have G.C.E. in five subjects, including English language, at 'O' level and two mathematical or scientific subjects at 'A' level. They should be Associates of the Library Association (or equivalent) or have extensive experience of work in a specialised library. In addition they should have experience of photographic library work and a good general scientific background.

Salary: Assistant Experimental Officer £495 (at age 18)—£1,055 per annum.

A married man will be eligible for house purchase assistance. The Authority has an excellent superannuation scheme.

Please send a POST CARD for application forms to the Personnel Department (A 2084/205), A.E.R.E., Harwell, Berks.

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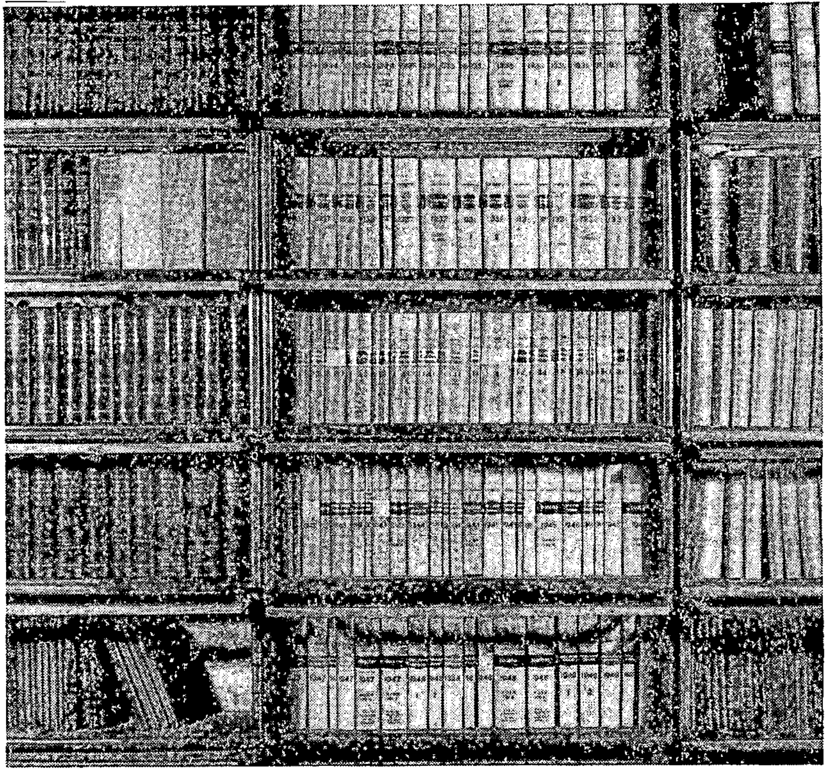

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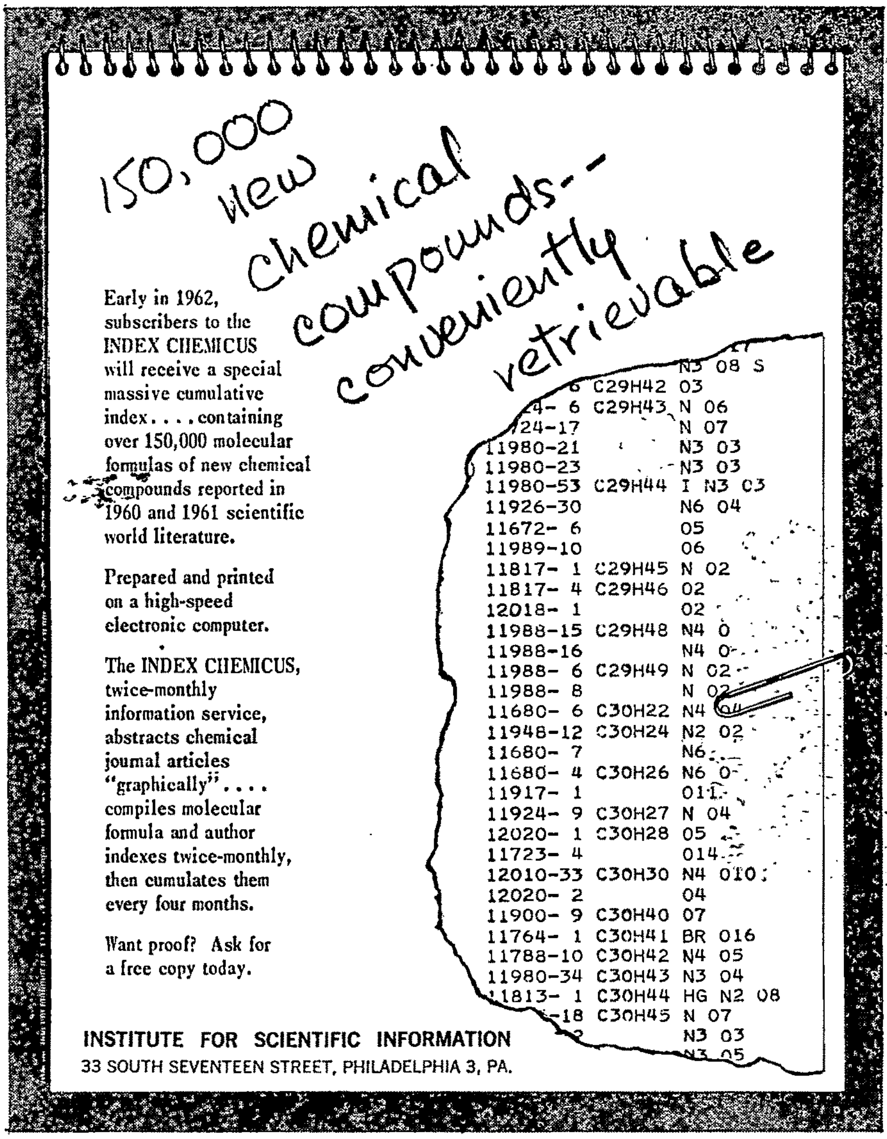

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Aslib Proceedings

incorporating Aslib Information

Some Problems of Bookselling

JULIAN BLACKWELL

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 **March 1962** **Number 3**

ASLIB CALENDAR

March

TUE.20. Fuel and Power Group 'Hobby-horse' evening.

THUR.22. Conference on sources of information on the Common Market at the Connaught Rooms.

FRI.23. Northern Branch Annual General Meeting in Manchester.

MON.26. Winter meeting at Aslib. Film show.

TUE.27. 'Information on a shoestring', course for part-time information workers.

April

TUE.10 – FRI.13. Junior introductory course on information work (repeat).

FRI.13 – SUN.15. Aeronautical Group conference at the College of Aeronautics, Cranfield.

MON.30. Winter meeting. 'Every librarian his own salesman' by Eric Simons.

May

TUE.15. Fuel and Power Group Annual General Meeting.

WED.30. Day visit to NLL, Boston Spa.

October

TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.

Resignation of Miss Ditmas

We report with regret the resignation of Miss E. M. R. Ditmas from the editorship of both *Aslib Proceedings* and the *Journal of Documentation.* This is the last issue of *Aslib Proceedings* that will appear under Miss Ditmas's editorship and she will no longer be Managing Editor of the *Journal of Documentation* after publication of the June 1962 issue. Miss Ditmas, who was Director of Aslib until 1950, is resigning in order to be able to devote more time to her own research work and writing. Aslib would like to record its deep appreciation of the excellent work which Miss Ditmas has done to establish and uphold the standard of both these periodicals since their first appearance.

Northern Branch

The Annual General Meeting will be held at 12 noon on Friday 23rd March at the Manchester Literary and Philosophical Society, George Street, Manchester. It will be followed, in the afternoon, by a talk on photocopying by Mr H. R. Verry, O & M Division, the Treasury, and an exhibition of photocopying equipment.

Fuel and Power Group

Members of the Group who visited Castrol House on 6th February found many features of interest in this modern building, officially opened in February 1960, and, in a view from the top of the twelve-storey tower, they were reminded of the rapidly changing skyline of the capital. On first entering the building they were impressed by the large mural of cast aluminium designed by Geoffrey Clarke and symbolizing the story of lubricating oil. They were interested also in the pneumatic tube document conveying system, whereby documents of up to foolscap size can be routed, by 'dialling' through an electronic sorting system, to their correct destination within twenty seconds. Other features of the building are the aluminium acoustic ceiling panels of Scandinavian design and the overhead central heating. The tour of the building ended in the comfortable cinema, where the party was entertained by three instructive and amusing films on the development and uses of oil as a lubricant.

Electronics Group

It is hoped to arrange a visit to the Royal Radar Establishment, Malvern, in September. Such a visit would necessitate a night in Malvern followed by a whole day tour of the Establishment. Bed and breakfast could be arranged at 19*s* 6*d* to 32*s* 6*d* per head. Members who are interested in this tour are asked to contact Mr N. E. C. Isotta, Ministry of Aviation, TIL 2, First Avenue House, High Holborn, London WC1.

National Productivity Year

The British Productivity Council has declared November 1962 to November 1963 a National Productivity Year. The aim is to focus attention during that year on every possible means within the capacity of management and workers of increasing efficiency. The Year is under the patronage of the Duke of Edinburgh.

Professional bodies are invited to contribute to the success of the year by giving special prominence to those of their activities which can influence productivity and by promoting the wider use of their services. It is Aslib's intention to give active support to the scheme and a small committee has been established to discuss the forms which Aslib's contribution can best take. The British Productivity Council envisages that activities will be undertaken both on a national and on a regional basis, and the three Aslib branches are accordingly represented on the committee.

Union List of Miniature Scores

The UK Branch of the International Association of Music Libraries is to compile a union list of miniature scores in the UK. Such a list should prove of great value to many special libraries and, to assist the undertaking, Aslib has been pleased to make a small contribution towards the cost. It is understood that the task of compilation is likely to take about three years.

Touring Exhibition of Photocopying

A travelling exhibition designed to demonstrate a complete range of up-to-date photocopying equipment has been mounted by Kodak Limited in association with Photostat Limited. The exhibition includes equipment for reproducing and microfilming letters, drawings, and other originals, and methods of making low-cost paper masters for reproducing lists, forms, etc. It will visit the Imperial Hotel, Birmingham, from 20th to 22nd March; Cutlers Hall, Sheffield, 27th to 29th March; Kodak Limited, Gateshead-on-Tyne, 3rd to 5th April; and the McLellan Galleries, Glasgow, 10th to 12th April.

FID Status with Unesco

The International Federation for Documentation (FID) has announced with appreciation the further recognition of its work by Unesco. This is evidenced in the decision of the Executive Council of Unesco to transfer the Federation from Category B, consultative status, to Category A, association status. Category A includes only those organizations which have a basic interest in most of the activities of the Council, whereas Category B implies a more restricted field of interest. *FID News Bulletin* describes Category A as being reserved for a limited number of international, non-governmental organizations having proved ability in subjects of importance to education, science, or culture, and able to make an important contribution to the activities of Unesco.

UFOD Publication

The report of the meeting organized by the Cercle Culturel de Royaumont with the collaboration of the Union Française des Organismes de Documentation (UFOD) and held at Royaumont in December 1960 is contained in a special two-volume issue of *La Documentation en France*, new series, number 2 bis, 1961.

Subjects covered include the human sciences, arts and literature, information, and the exact and natural sciences. The bulletin is obtainable from UFOD 65 rue de Richelieu, Paris 2e.

Managing Director of NIDER

Mr M. Verhoef, who has been Managing Director of the Nederlands Instituut voor Documentatie en Registratuur (NIDER) resigned this post on 1st March in order to join the Information and Documentation Centre of Euratom.

Mr A. van der Laan, lately Documentation Advisor at the Netherlands Ministry of Economic Affairs, has succeeded Mr Verhoef as Managing Director, NIDER.

Director of Polish Information Institute

FID reports that Mr W. Piróg succeeded Professor Z. Majewski as Director of the Centralny Instytut Informacji Naukowo-Technicznej i Ekonomicznej at Warsaw in November 1961.

World Medical Periodicals

The World Medical Association (WMA) this month published the third edition of *World medical periodicals* (1961). More than 5,800 titles are listed alphabetically, with publishers' addresses and abbreviated titles. The abbreviations follow the code of rules used by the *World list of scientific periodicals* as modified by *ISO recommendation* R4: *international code for the abbreviation of titles of periodicals*. Slavonic and Greek titles are included in normal transliteration, Japanese titles are included in translation, but titles in Chinese are not included. *World medical periodicals*, 3rd edition, is available from the British Medical Association, BMA House, Tavistock Square, London WC1, price 2 guineas, or from the World Medical Association, 10 Columbus Circle, New York 19, price $7.

NY Special Libraries Directory

The 9th edition (1961) of *Special Libraries Directory of Greater New York* is now available. It lists 845 special libraries with addresses, telephone numbers, and information about staff, size, and subject collections. The Directory is available from Miss R. S. Glicksman, Librarian, Hydrocarbon Research Inc., 115 Broadway, New York 6, NY, USA, price $5 (36*s* 6*d* approx.). Cheques should be made payable to Special Libraries Association, New York Chapter.

American Microfilm Meeting

The 11th Annual Meeting and Convention of the United States National Microfilm Association will be held from 25th to 27th April at the Mayflower Hotel, Washington. The theme for the convention is 'A look into the future of microreproduction'. In addition to the programme of papers and discussion, there will be an exhibition of microfilm systems and equipment in which more than seventy-five manufacturers, dealers, and service companies have arranged to participate.

Push-button Library

An automated 21st-century library is to be one of the major exhibits at the 'Century 21' World's Fair in Seattle, which opens on 19th April for six months. 'Library 21' has been designed by the American Library Association in co-operation with leading firms in the electronics field. It is intended to demonstrate the role that the library of the future will play in the field of information communication. Through the medium of electronic machines questions on almost every conceivable subject should receive prompt, accurate replies. Teaching machines and closed-circuit television also will be part of the library equipment.

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Institute of Library Science	India	S. S. Saith
Institution of Heating & Ventilating Engineers	London	Miss E. D. Norman
Jamaica Industrial Development Corporation	West Indies	Miss S. I. Bacchus
Jenkins, Robert & Co. Ltd	Rotherham	H. T. Jenkins
Kingston upon Hull College of Technology	Hull	S. Cobb
Leo Computers Ltd	London	Mrs M. H. Moir
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Skogsbiblioteket	Sweden	Miss I. Matern
Specifile (Overseas) Ltd	Irish Republic	Miss R. Brennan
Studies in the Function & Design of Non-surgical Hospital Equipment	London	L. B. Archer
Sulphur Institute	London	J. Platou
Tank & Industrial Plant Association	London	A. E. Freestone-Barnes
USSR Embassy	London	A. A. Kulakov
Wall, T. & Sons (Meat & Handy Foods) Ltd	London	Dr R. S. Hannan
West Ham College of Technology	London	

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Lowe-Willetts, L.	Usk
Marshall, K. E.	Ambleside
Meek, H.	Belfast
Strachan, R. B.	Dundee
Tashima, Miss M.	London
Wall, W.	London

SOME PROBLEMS OF BOOKSELLING

JULIAN BLACKWELL
Blackwell's

Aslib Aeronautical Group Winter Meeting, London, 22nd November 1961

A BOOKSELLER'S function is to find and to supply to his customers any book from anywhere in the world. If he is also a subscription agent, then he must perform the same service with periodicals. He may be asked to supply any book, from that everlasting bestseller the Bible, now available in up to five hundred versions, editions, sizes, and colours (and most customers try to see all five hundred before they make up their minds) to *A critical review of the world literature on the lepidopterous stalk borers of tropical graminaceous crops*—from Rostand's *Cyrano de Bergerac* to *Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen-Band* 81—from *Nature,* for which we have several hundred subscriptions, to *Archiv für Molluskenkunde,* for which we have one.

I will try to talk, as far as possible, from the point of view of booksellers as a whole, but I am afraid that I shall have to refer quite often to our own experience and practices.

At this time when the retailer or middleman is out of favour except as a scapegoat, perhaps we should consider the points that justify the existence of booksellers. There are some who think that librarians could go direct to the publishers (not that the publishers would welcome it) but a moment's thought shows this not to be worth serious consideration.

There are some 300,000 different books currently in print in Britain alone. It is impossible to estimate the number of publishers responsible for this output. The Publishers Association alone has some 380 full members. *The Handbook of publishers and addresses* contains approximately 1,600 addresses and to these must be added a considerable number of institutions, learned societies, associations, industrial firms, local government offices, and even private individuals.

It is (and must be) the bookseller's function to obtain this enormous variety of items from this great range of sources, keeping in stock as wide a selection as he can. His problem can be contrasted with, for example, the business of Marks & Spencer, which the year before last had a turnover of £148,000,000 (or between three and four times that of the whole home book trade turnover), selling some five hundred articles which, even if allowance is made for all variations in size, colour, and so on, could be estimated not to exceed five thousand items. The book trade has been compared with the record business, but the record business only has 26,000 records currently in print and you can see that 26,000 is very different from 300,000.

This, indeed, is not the full measure of the bookseller's problem. These hundreds of thousands of items are in a constant state of flux. Over 23,000 new titles and new editions are being added each year, and many thousands go out of print at the same time. Many titles, although currently in publishers' lists, go in and out of stock. The book that was available yesterday is binding today and may be available next spring; or a new edition is in preparation and may be available next autumn.

Books cover every field of human activity and inquiry over the whole course of recorded history. They present a picture of ever-growing complexity, as learning ramifies and research grows constantly deeper and more minute. The Dewey system, based on a thousand main classifications, is now (I believe) subdivided to up to ten places of decimals. Those who handle books, therefore, need not only considerable experience in the trade but also a high standard of education to guide them through the highways and byways of knowledge. Even the humblest assistant in a bookshop must know, for example, that he must not look for Trotman-Dickenson's *Free radicals* in the Politics section but among the books on Physical Chemistry; and that Duffin's *Amphibian,* or Davie's *Articulate energy* are to be found not in the Science but in the English Literature.

Even the largest bookseller cannot hope to keep in stock more than a fraction of the titles available. His customers, therefore, expect from the bookseller a special order service which no other retailer, even though he deals with a much simpler range of products, is ever required to provide—even in the case of items substantially more costly than the average book—and they are querulous if this service is not first class.

Discovering the publishers of books not in stock is frequently a difficult and often an impossible task. I have estimated that we have some 225 shelf feet of trade catalogues, bibliographies, and works of reference, excluding duplicates and antiquarian bibliographies which between them probably double this number.

Librarians who include the publisher's name on their orders make our task easier, particularly when they get it right. Sometimes we have to write back to the librarian, who may produce all the required details and say that he did not give them in his first letter because he was afraid we should be offended if he did not assume that we knew it all anyhow. On the other hand, we may get a rude letter back, in which the customer tells us that, if he had known, he would have given us the information straightaway and, after all, what were we here for?

The garbling of authors' names makes our job harder. One of my colleagues is also an author, by the name of Cutforth. He has collected some delightful versions of his name from orders—Crunchfield, Catporch, and Cutfroth. His favourites are Cuttlewhittle and, of course, Cutthroat.

To illustrate the points I have made I will give you some figures we collected when we recently analysed a day's orders at Blackwell's. We received orders for a total of 3,198 items from forty-three countries. If we exclude orders for periodicals, music, second-hand, American, and foreign items we are left with:

2,786 books published by British publishers.

Of these we had 1,188 in stock.

The remaining 1,598 were ordered from 246 publishers including 37 who do not appear in the list of publishers and their addresses.

192 items were reported 'not yet published'.

141 were reported 'binding', 'reprinting' or 'out of stock' and these we recorded and hoped to supply in due course if they became available within a reasonable time, and near the original price.

180 were reported 'out of print'.

Items which we order from English publishers take on average seven days to come to us in Oxford, according to the time of year, and we are much luckier than most as our vans collect from London every day. Some books come regularly in three days, some in thirteen, some in twenty-three, and some even in thirty-three or forty-three and, believe it or not, some in sixty-three days. We regularly get books from Berlin more quickly than from London. We recently ordered a book urgently from Kuala Lumpur in Malaya and received it eleven days later, well before some of the English books on the same order had arrived.

We are most grateful to firms like Allen & Unwin, who consistently head our publisher's league table of deliveries, regularly supplying books by return; and Wiley's, who have studied stock control so carefully that they can supply 99 per cent of orders from stock.

The large book publishers are now in turn suffering from 'computeritis'. When they put in a computer it takes them at least a month to supply books, until they get it working properly. One very large publishing firm is still suffering badly from its computer. When the computer was first put in we had to wait up to two months to get our books and now we still have to wait three or four weeks.

Publishers are sometimes absent-minded about bookseller's orders for books which are 'not out', 'reprinting' or 'binding'. Booksellers must, therefore, send periodical reminders to publishers about outstanding orders for these items. Our experience shows that 15 per cent of the items are supplied at once, and a further 10 per cent are reported 'Publication abandoned' or 'Out of print'. 'Out of print' in this case means that the publishers have originally reported these items 'reprinting', waited to see what orders came in, and when these were not large enough, they abandoned publication without telling the booksellers, whose customers were still hoping to receive the books.

I seem to have told a long and woeful tale of difficulties, troubles, and tribulations. Of course, the profitability of bookshop sales varies enormously. Let me illustrate this by describing the ideal and the worst possible sale.

Into your shop come three copies of a £10 art book, at a discount of 33⅓ per cent, plus, if you are lucky, 2½ per cent extra incentive discount. As soon as you have put the books on your counter a customer picks them up, presses £30 into the nearest assistant's hands and walks out of your shop. How happy booksellers would be if all sales were like this, but unfortunately they are not.

You now receive an order by post from another customer and find that his address has changed, so you must correct your customer index, mailing list stencil, and account ledger card. The order is for 'SMTC-R-234-61. Sorry no further information'. Your assistant, of course, finds that it is not in stock and, as he does not know the name of the publisher, he consults the head of his department. The (well-paid) Head of Department checks through numerous reference books and finally writes to the US Dept of Commerce. You acknowledge the customer's order. The US Dept of Commerce writes back saying 'Not ours', and so you write to the customer asking if he has, by any chance, got any more information. The customer replies saying that he has just discovered that the SMTC is the Snodgrass Machine Tool Company of Ohio. You look up the address and order the report by air letter.

Four weeks later the customer's purchase department sends through a standard reminder asking for a progress report on order no. RQ/Lib 10753. You look up the order, track down the order card and give a report. The publisher now replies that the item is 'Reprinting, order not recorded'. You tell the publisher to record the order and you tell the customer that the report is reprinting. Months pass and the customer asks for news of his order. You remind the publisher, the publisher has forgotten to send the report and now sends it without an invoice. The invoice comes–it is for 25*c* less possibly 5*c* for the dealer plus 10*c* postage. You send off a special dollar cheque in payment and you charge the customer (invoices must be in triplicate). You pack and post the report and breathe a sigh of relief. But wait, the report is returned as it is imperfectly bound, and so the whole process starts all over again. You eventually send a replacement to the customer and breathe another sigh of relief. A fortnight later the purchasing department writes in for a copy of invoice no. FA/1051326, you send one, and then you really have finished the transaction, at a loss which is quite impossible to calculate.

It is unlikely that all this would happen to one order, but I can assure you that these sorts of things are happening to orders all the time. We now even have a special form for sending back imperfect copies of books to publishers. A good bookshop must be prepared to deal with these sorts of orders as well as the easy ones.

I make no apology for harping on the economics of bookselling. As you will come to understand as this talk goes on, booksellers must watch carefully the economics of their trade, not in order to make large profits but to make any profit at all. I cannot stress strongly enough that the straightforward orders keep the bookshops going–orders for books which can be pulled off the shelves, or easily recognized books which can be ordered from the publishers without difficulty; in general, orders which flow easily through the various bookshop systems. As soon as things start getting difficult and going wrong, then the overheads pile up very rapidly indeed and quickly whittle away the bookseller's profit margin.

May I illustrate this by showing you two orders both from firms who are very large customers. One is for one copy of *Relationship of cooking methods, grades and frozen storage to quality of cooked mature Leghorn hens,* 1954 Pub. No. T1077, Superintendent of Documents, Washington, price about one shilling. This customer orders a large number of these cheap items, most of which we should very much prefer him to get direct. I am plucking up courage to mention this to him. When I do, he may say, 'Certainly, you should have told me this long ago', or he may say, 'You are our bookseller; this is part of your job'.

The other order is a magnificent one for sixty-five books worth a total of

£172. But all these books are on approval and if the customer returns too many of them, or if any should come back slightly damaged, and if for some other reason we cannot return them to the publishers and cannot eventually sell them, we shall make a loss on this apparently wonderful order.

Librarians need to see books on approval and booksellers must give this service, but I am sure you can appreciate that if too high a proportion of books sent on approval are returned, then the bookseller will begin to make a loss on the business.

We must periodically go through our shelves to look out for potential bad stock which has accumulated through books being returned from approval, or from bad or unlucky buying. Science and technical books become out of date and unsaleable more quickly than any other subject, and if we are not careful we find our shelves quickly silting up with bad stock. Most publishers will take back books if they are in mint condition but the pruning of shelves is a time-consuming and expensive occupation.

Some English publishers try to solicit sales direct from librarians. Is it to your advantage to buy books direct from the few publishers who do this? The books will cost you exactly the same whether you buy them direct from the publisher or from your bookseller. In most cases these books are the ones which booksellers classify as easy orders. If, therefore, you expect your bookseller to deal with all your awkward orders you should support him by sending him your straightforward orders. One of our librarians recently ordered from us forty copies of a McGraw-Hill book costing 93*s*. For this librarian we will deal with any number of awkward and unprofitable orders as we know he supports us with his easy orders.

Orders come to us in all forms. Some customers write twenty-nine items in 5pt Biro on our small reply cards. Others will order one 7*s* 6*d* item using ten sheets of quarto forms. Of course, we get cross letters, complimentary letters, letters which make us laugh, and letters which make us cry. With this particular letter we did not know whether to laugh or cry:

> Dear Sirs,
>
> I apologize for lifting unobtrusively a book from your shop in Oxford. I enjoyed the book very much but I am afraid I can't find it now to return it to you. In any case it was a 2*s* 6*d* edition and its s/h worth would not be great.
>
> Yours faithfully,

I think this is one of the nicest letters we have ever had:

> Dear Sirs,
>
> Your helpful letter of 21st November has come. Thank you for your pleasant handling of my fairly small requests, which you treat as though they were as important to you as they indeed are to me.
>
> Yours faithfully,

Some customers have special delivery and invoicing instructions which must be rigidly adhered to, often by a girl of 16, and even though the order form may give other instructions or no instructions at all.

> 'The code 1095 BLA must be added after the name........................on all invoices and credit notes. Mark all the correspondence for the attention of.........................'.

This is simple in comparison to a number of the overseas institutions. Every time we send something to one institution in Pakistan the invoice typist must read carefully through twenty-two lines of instructions, all of which must be obeyed. Some firms have other stipulations. I quote from Condition H of the Phillips Petroleum Company Terms and Conditions:

> 'In connection with the performance of work under this Purchase Order, the Seller agrees not to employ any person undergoing sentence of imprisonment at hard labor.'

Of course, a number of staff think this applies to them!

I thought you might like to hear a few words about American and foreign books. Most American publishers work rigidly to elaborate and mechanized systems. A South African medical bookseller, whom we met recently, still goes ashen at the memory of a recent experience. He sent an order no. 1819 to a well-known American publisher for one copy of an 8-dollar book to be sent to a doctor at his private address in Cape Town; the machine (or its operator) went mad and in due course thirty-two mailbags arrived on the doctor's doorstep, containing 1819 books, with a bill for well over ten thousand dollars, quoting order no. 1.

About two-thirds of American books can now be supplied by agents in England. If they have titles in stock these can be obtained just as quickly, or slowly, as English books. Some agents do not, however, carry full stocks and then we must wait for them to order bulk replacements from the United States and these can take up to two or three months to arrive.

When we order books from America we send the orders by air, but these still take about five to six weeks to fulfil. Sometimes when the books come we have to wait another week or two for an invoice. Sometimes we wait five to six weeks and are sent a *pro forma* invoice, we send the money and then have to wait another five to six weeks for the books. Often the ordering and payment is complicated. For instance, we must keep a credit account in dollars with the Office of Technical Services.

The West European book trade runs on similar lines to the British book trade. We keep a large stock of foreign books but, as there are up to one million titles in print, this stock can only be a very small selection of the books available; therefore it is usual for an even higher proportion of books to be ordered specially from the publishers. Our foreign experts seem to guess remarkably well, for our calculations show that 60 per cent of our customers' orders are supplied from our shelves. Information about foreign books is gathered for each country from publishers' catalogues and prospectuses, from bibliographies, and from the local equivalent of the *Bookseller*; in Germany the *Börsenblatt*, in France the *Bibliographie de la France*, and so on.

Books are usually ordered direct from the publishers in each Western European country except for the small or provincial publishers from whom we order infrequently, and except when we cannot trace a title, then we enlist the aid of one of our local agents who, with their local knowledge, are often able to track down the source of supply. We have bank accounts in most important foreign countries and are able to write cheques in Oxford for most main currencies, often a great advantage when paying foreign suppliers.

We can obtain French books in two weeks. French publishers deliver our parcels to Hachette in Paris who send them to us by air. Italian books come in six weeks; but with West German books the service is excellent. With most West German publishers we get a seven to ten-day service, and you can see that this compares very favourably with that of some British publishers. We have a young man working in our Foreign Department, who used to work in the German publishing house of Westermann at Brunswick. There the staff work in shifts from 6 in the morning until 10.30 at night. They receive the morning post at 9 am and it is dispatched at 4 pm; the afternoon post comes at 3 pm and it is dispatched at 10.30 the same night.

All East German books come through Deutscher Buch-Export-und-Import at Liepzig, which is a wholesale concern owned by the State. We get books from them in about a fortnight.

The Russian book trade is arranged in State publishing houses. These are large concerns which specialize in various subjects such as geology, chemistry, and fine arts, etc. All export is done through a firm called the International Book which establishes agencies in the various countries, usually giving them a 99 per cent monopoly. In the United Kingdom their agents are Collet's with whom we work closely and whose catalogues we distribute. Russian books cost the same whether you buy them from us or from Collet's. The most important thing to remember about Russian books is that they go out of print very fast—in months, weeks or even days. They print huge stocks for pre-publication orders for their institutions, schools, etc., but only allocate a small quantity for export, so quick ordering is essential. If items are not in stock at Collet's and are out of print, we also try agencies in other countries, and can often pick up copies. The best way to make sure of getting new Russian books is to subscribe to *Novye Knigi* (New Books) which is published in Moscow about once a month and lists all new books. Orders should be sent to your bookseller as quickly as possible, giving titles in Russian and, if possible, the date, and the name of the publishing house. Other Iron Curtain countries have similar organizations.

I am sure you all know so much about periodicals that there is very little I can tell you. I will just point out the advantages which are, surprisingly, not very widely known, of getting your periodicals through a subscription agent rather than direct from the publishers. This, of course, excludes newspapers, etc., which are almost always better obtained at your local newsagent.

1. The chief advantage of having an agent is the saving of time and labour. You tell the agent what you want and he does all the donkey work.
2. The agent knows the manifold pecularities of the publishers. Some will only take subscriptions by the calendar year, some by the volume, some by the current number and others have a waiting list. Some have a controlled circulation and some insist on cash with order. With one publisher there is always a two-month delay, and after the order has been

received we get an acknowledgment slip with a reference number saying that the subscription has been entered, but not when; and so we must write back and ask them, in order to keep our records accurate.

Most publisher's service is excellent. We were delighted when William Blackwood & Sons supplied us with a new copy from stock of *Blackwood's Magazine*, May 1821.

3. The agent will deal with foreign currency difficulties, and many foreign publishers give much better service if orders come through well-known agents. This, of course, helps to cut down the delay in starting new subscriptions.
4. The agent is responsible for the efficient handling of renewals, to ensure continuity, and will look after claims.
5. The agent will provide information on new and obscure periodicals and will, of course, supply price quotations, subject lists, and catalogues. Most good agents maintain an extensive collection of reference books covering periodicals.
6. You can pay for all your subscriptions with one bill once a year at any time of the year you wish.
7. The agent will prevent the clash of customer's special ordering and invoicing instructions with the publisher's own invoicing and ordering systems.

Publishers allow agents a small discount and on this discount they provide all these services. In most cases the price of periodicals is the same whether you order them direct from the publishers or through an agent. Exceptions to this are some American and foreign journals on which agents put a small surcharge, and publications of some societies on which agents receive no discount and therefore must add a small handling charge. As this surcharge varies from agent to agent it is best to check round before you choose your agent.

The agent's watchword must be ACCURACY; even so misunderstandings do occur. Our allied publishing firm produce a learned review on French medieval literature called *French Studies*. We received from Messrs. W. H. Smith & Son of Eastbourne this plea:

> Dear Sirs,
>
> Herewith please find one copy of *French Studies* which was ordered for Group Captain ...., the York Hotel, Eastbourne. On seeing above title our customer refused same as it was not quite what he had expected. Will you kindly assist us by accepting return? Your assistance in this matter will be greatly appreciated.
>
> Yours faithfully,

How should a bookshop publicize itself to encourage its customers to spend more and to attract new customers? The little press advertising it could afford would hardly be noticed in the present-day flood of advertising. Bad and insufficient advertising is one of the quickest ways to waste money. The only real exception in the book trade is Foyle's, who, based on London, have advertised brilliantly and consistently, and have done very well out of it.

Some specialist booksellers advertise in specialist journals, which are comparatively very cheap. We are running a series in the *Aslib Proceedings* which has been very successful. You may think we are throwing money about by always taking a full page every month, but it is the only regular press advertising we have ever done, and we only spend about 0.03 per cent of our turnover on advertising (other than from a sense of charity) or, if my mathematics are right, £3 for every £10,000 worth of books and periodicals that we sell.

Direct mail is really the only economic way for a bookseller to advertise. We print and send out some three-quarters of a million catalogues every year, on which we spend up to 2 per cent of our turnover. A continuous deluge of prospectuses, circulars, catalogues, and other publicity material of all shapes and sizes falls on librarians' desks. Therefore a bookseller should take care not to waste the meagre sums he can afford to spend on publicity by sending material that is of no use to the librarian or is already duplicated from other sources. I believe that most librarians are so efficient that they do not really need any more information from their bookseller, although they are polite enough to say that his catalogues are helpful.

With the help of librarians and information officers, Blackwell's have worked out and started a system which we hope will rationalize the deluge of prospectuses and catalogues. For each book published on each subject in which a librarian is interested we send a 5 in. × 3 in. card giving bibliographical details and, if possible, a short blurb about the book.

Talking of catalogues, here is an exchange of letters we had recently.

One of our overseas librarians to us:

> 'I will be very thankful if you could send me some information in regard to the *Mammoth Catalogue* that is being prepared by the British Museum, of which eight volumes were published recently.'

Blackwell's to the British Museum of Natural History:

> 'We have received an inquiry concerning the *Mammoth Catalogue* which we understand you are preparing. Our customer would like to know the number of volumes so far published and the price of the complete set.'

British Museum, Department of Printed Books:

> 'Your letter of 27th October addressed to the British Museum of Natural History has been passed to the British Museum, Bloomsbury. The British Museum (Natural History) are not in the course of preparing a catalogue on mammoths and wonder whether perhaps your customer has been misled by a reference to the large size of the new British Museum Catalogue of Printed Books.'

What do publishers and booksellers make out of selling books? Some years ago the late Sir Humphrey Milford, publisher to the University of Oxford, summed up the publishing trade most admirably to my colleague who runs our publishing firm. 'A good publisher,' he said 'will make a large number of small profits and a large number of small losses. On a very few books he will do very well indeed and on almost as many he will make a considerable loss.'

In 1952 at the request of the Booksellers Association the chartered accountants Messrs Chalmers Wade & Co. examined three years' accounts of seventeen booksellers, who represented a cross-section of the book trade.

The analysis of the new book departments showed that the average net profit before tax was 0.44 per cent, the five least financially successful making a loss of

4.5 per cent and five most financially successful making a profit of 3.66 per cent.

In round figures details of the accounts were:

taking sales as 100 per cent
cost of books and carriage inwards 78 per cent
giving a gross profit of 22 per cent
which was split up between wages and salaries 13 per cent
overheads 8 per cent
leaving a net profit of 1 per cent

Since 1952 better discounts and carriage allowances have added a little to the bookseller's net profit; but increasing rents and rates have in many cases swallowed up this badly needed increase. Many rents have been doubled and trebled and sometimes increased five times. London booksellers pay enormous sums in rent and, apart from the multiple shops, you will find very few booksellers left in any high streets.

Next June the Net Book Agreement comes before the Restrictive Trade Practices Court. The Net Book Agreement is an agreement between publishers that they will maintain the resale prices of their net books, their invoices state that 'Net books are supplied subject to the Publishers Association current standard conditions of sale registered under the Restrictive Trade Practices Act 1956'. The law allows them to take to court any bookseller who sells net books below the stipulated price. Under the terms of reference of the court an agreement is guilty until it is proved not just innocent, but actually of substantial benefit to the public.

The publishers will defend their agreement and we are told it will have a good chance of surviving. What will happen if it does not? Publishers believe that resale price maintenance is necessary for the health of the book trade and they will undoubtedly do their best to maintain their prices individually if the defence of the agreement is unsuccessful.

If Resale Price Maintenance is outlawed by the Government, then the book trade will undoubtedly be in great trouble. May I quote from *Fair Trade* by Andrews and Friday: 'The ordinary bookshops which rely on the swings to make up for the roundabouts, providing a general service to book buyers, and the specialist bookshops would be greatly reduced in numbers, it seems clear; prices of books in general would have to rise—at the publishers, to compensate for the smaller editions and the higher risks with fewer outlets; at the retailer margins on ordinary books and on specialist publications would have to be higher.'

Librarians now pay fixed prices for books. This in itself is a convenience even where the swings are concerned; but, more important, they pay no more than the fixed price for a lot of roundabouts on which booksellers make a loss or very little profit. If librarians of special libraries should get a discount on the swings, they would have to pay a heavy service charge on the roundabouts, and might well end up worse off.

I should like to end by saying how increasingly vital I think librarians are becoming to booksellers. For, apart from paperbacks, the book trade is rapidly reaching a state where, as James Roche said, 'Some men borrow books, some men steal books, and others beg presentation copies from the author.'

Letters to the Editor

CLASSIFICATION

Dear Miss Ditmas,

I am flattered that Mr Bird has found my article interesting enough to comment upon with such alacrity. I would be even more flattered if I could be sure he had allowed himself time to read it.

I am sorry that what I wrote appears 'alarming candour'. I do not recall any particular alarm when this little essay was given its first airing in Manchester a couple of years ago. But I am afraid that Lancashire lads are resigned to a certain degree of unnecessary flap over plain words, in what is unkindly regarded as the woolly and waffly South.

What is this accusing finger I am supposed to point? I make no accusations though I admit, when reading most of the current output on classification, to having to refrain from following an impulsive Churchillian example. If the description of what goes on in practice provides a contrast with the prevailing mythology, so much the better.

I confess to a slight smile that Mr Bird jumps to the conclusion that I refer only to special libraries. It had better go on record, therefore, that my observations began in some of our better university libraries. Subsequently, I was happy to verify that the procedure is essentially the same in the better special libraries. If the routines I describe were carried out in all of them, one would not have to worry too much.

Please note that nowhere in the original do I say that '. . . many people classify badly . . .'. Let us, therefore argue about what I said, not what Mr Bird thinks I said. Equally, it is not much use arguing about 'good' classification since, as Joad used to say, it all depends on what you mean by 'good', and though Mr Bird's idea of the good may be good for eternity, some of us have in a working day to produce evidence of some library work as well.

I am sad that Mr Bird still thinks 'the fact that the UDC number for a magnetron is longer than the word is not important'. It is equally not important to some classers to transcribe the aforesaid thirteen digits and four full stops correctly. If he will read on to page 40, he will find quoted there an article, reference to which will show him why he is wrong.

It is because the written record of what is already known is already complex—and this applies not only to science—that I warned against seeking the answer in complicated theories such as have been fashionable in recent years. An Education Officer will know that it takes people several years of pre-graduate study, and now usually post-graduate as well, to gain some detailed knowledge of one limited special subject. These are the people we are serving in academic, industrial, and laboratory libraries. Yet of these special subjects, the librarian is taught nothing, and all articles, education, and courses on classification are discussed in terms of anything and everything except the subject matter. How then are we to set about 'defining' scientific information; how do we fit it into a 'map of knowledge' which does not, never has, and shows no signs of existing? There is, for example, not even any complete agreement among chemists on the terminology of organic chemistry.

Yet the illusion is still carefully fostered that an ideal, all-embracing scheme will give librarians the wherewithal to sort out this complexity. In other areas of education, this is a myth which went out with the Encyclopaedists. Only librarians still lay down the law about the 'right' ordering and arrangement of everything from Astronomy to Zirconium.

I must leave Mr Bird to his dream of being 'presented with more information than one could have dreamed existed in the system.' Forgive the irreverence but it conjures up the vision of pressing the button and hitting the jackpot. Let us stop kidding outselves that a 'well-designed classification' 'presents' us with the information. It does not. The information is already there, provided by the efforts of printers, publishers, editors, researchers, and—dare one add that forgotten man, the author. Finally, as regards the proposed investigation of effort-in-input to information-in-output, this is one of things Aslib's Cranfield brethren are supposed to be doing!

While on the subject of what Aslib is supposed to be doing, I am intrigued as to how a letter dated January comments on an article published along with it at the end of February. Perhaps one day Aslib will give other Editors the low-down on this 'ere reverse sequence. I only regret they do not extend the rapid facilities offered to their own staff to other contributors—even to mere members. I am waiting to hear what has happened to some even more alarming candour. Doubtless Aslib are about to make the next great leap in information by cutting out the original and publishing the reply. I will prepare the gilded frame for the rejection slip.

Yours sincerely,
RAYMOND MOSS,
St. Helens, Lancs.

28th February 1962.

Madam,

In his excellent and candid article in your issue of February 1962, Mr R. Moss drives yet another, and perhaps nearly the last, nail into the coffin of classification, and about time too.

The principle of classification is the same as that of a map, with one location for each item. To fix this location only two dimensions are required, and the more detailed the map, the greater is the accuracy, or the number of digits in the numbers denoting the dimensions. It is even worse than this with the decimal system of classification, since this attempts to locate every item of knowledge not on a two dimensional plane, but on a one-dimensional line.

This is of course theoretically possible, but is a completely unwarranted restriction.

As Mr Moss says, the idea of classification arose from the librarian's problem of deciding where to place a book on his shelves. A single book can have only one position and therefore a one-dimensional scheme is all that is required. But knowledge is not one-dimensional, but multi-dimensional, and moreover, the areas, or volumes, with which we are concerned are not unique, but overlap and interlink. Such a domain can only be mapped by a multi-dimensional system.

The attempt to make the decimal classification try to cope by means of multiple entries only toys with the problem without solving it, and only serves to render the system more complicated and unmanageable.

Mr Bird is only half right when he says that knowledge is complicated and therefore can only be adequately representted by a complicated scheme. It is quite true that knowledge is complicated, but many complicated entities can be simply represented.

The coming system for indexing data is undoubtedly the 'feature' principle, which is the basis of systems such as the Uniterm, Peek-a-Boo (wretched name!) and the well-established Hollerith and Powers Samas systems.

This principle allows a virtually unlimited number of 'dimensions' and, moreover, these need not be numerical, but directly ideological. The actual operation of such systems is not complicated but delightfully simple and direct. Moreover it does what the UDC cannot do, namely allow for expansion in all directions and for the continual changes which are occurring in the structure of knowledge.

Among those who have studied, adopted, and tested the feature principle there is no doubt whatever that it will rapidly supersede classification.

It is my opinion that in order to keep abreast of the times, Aslib should make a special study of the feature principle, and should disseminate knowledge of its practical realizations.

Yours,

G. M. BOYD, O.B.E.,

23rd February 1962. Lloyd's Register of Shipping, London, E.C.3.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

*ASLIB. Electronics Group
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*COUNCIL ON LIBRARY RESOURCES
5th annual report for the period ending June 30, 1961. Washington, the Council [1961]. 66 p. photos.

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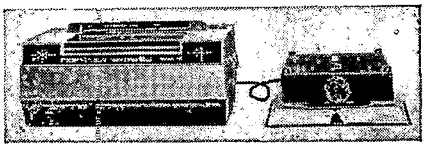

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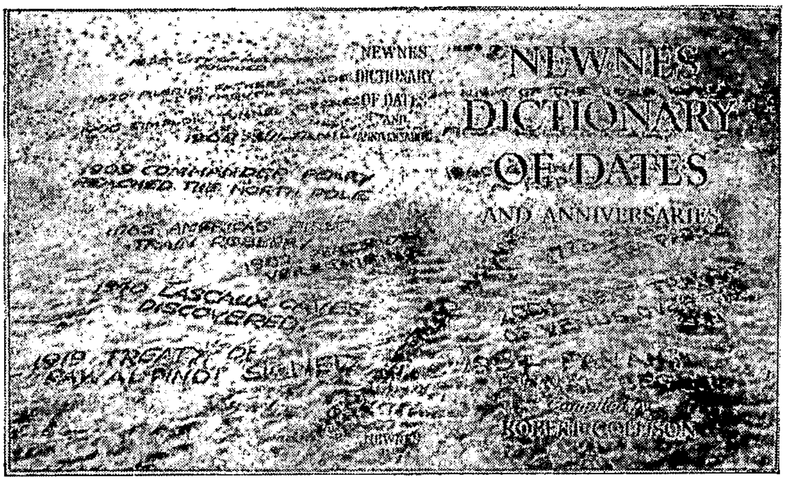
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ASLIB CALENDAR

April

MON.30. Winter meeting. 'Every librarian his own salesman' by Eric Simons.

May

TUE.15. Fuel and Power Group Annual General Meeting.

THUR.17 – FRI.18. Course on photographic copying in the information department, at S.E. Essex Technical College.

TUE.22. Advanced course on patents.

WED.30. Day visit to NLL, Boston Spa.

June

MON.4 – FRI.8. Senior introductory course to information work.

October

TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.

Aslib Research Librarian

Miss Barbara R. F. Kyle has been appointed Research Librarian of Aslib and, in succession to Miss E. M. R. Ditmas, Managing Editor of the *Journal of Documentation*. She will join the Aslib staff on 24th June. Barbara Kyle is at present Assistant Director of the National Book League, which appointment she has held since 1958. After wide experience in public libraries she was, for ten years, Librarian of the Royal Institute of International Affairs. Since 1955, thanks to grants from both the Nuffield Foundation and the United States

National Science Foundation, she has drafted and is testing a classification for social sciences. She is a member of the Unesco International Advisory Committee for Bibliography, Documentation, and Terminology, and a Vice-President of the International Federation for Documentation. For many years she has taken an active interest in Aslib affairs. She was elected to the Council in 1949 and has since given her services as Chairman of the Conference and Meetings Committee (1950–51), Honorary Secretary (1951–55), Chairman of Council (1955–57), Chairman of the International Relations Committee (1957–61), Chairman of the Research Committee (1961–62), and has served also on the Education and the Executive and Finance Committees.

Senior Introductory Course to Information Work

A senior introductory course to information work will be held at Aslib from 4th to 8th June. It is intended for graduates entering information or special library work, or for other senior persons placed in charge of information departments without previous experience of work of this nature. It will introduce them to the basic principles governing the handling of information, and give guidance on the ground they should cover in further studies. Lecturers will include Miss Barbara R. F. Kyle, National Book League; Mr Anthony Nicholls, B.A., A.L.A., Birmingham University Library; Mr L. M. Payne, F.L.A., Royal College of Physicians; Mr K. D. C. Vernon, F.L.A., Royal Institution of Great Britain; Mr B. C. Vickery, M.A., National Lending Library for Science and Technology; and Mr Jack Bird, M.A., F.L.A., Aslib. The fee for the course will be £10. Intending students are advised to apply early, on the form enclosed with this issue.

Advanced Course on Patents

An advanced course on patents will be held on 22nd May at Aslib. This new course is a sequel to the elementary courses on work with patents held in recent years and covers different topics from those included in the advanced course held in 1959. It will deal with specific aspects of the broad subject of patents and patent law. Speakers, who will cover as fully as possible the anticipation of British patents by publication and by use, will be Mr F. Liebesny, B.SC., F.I.INF.SC., F.I.L., A.L.A., and Mr C. H. Greenstreet, M.SC., A.R.I.C., A.I.C.P.A. The fee for the course will be 3 guineas. Application should be made to the Education Officer, Aslib, on the form enclosed with this issue.

Handbook of Special Librarianship 2nd edition

The second edition of the *Handbook of special librarianship* is now available. The text of each chapter has been completely revised to bring it up to date and a considerable amount of new material is included, making a volume of 512 pages. The editor is, again, Mr W. Ashworth, Librarian, British Nylon Spinners. *Handbook of special librarianship*, 2nd edition, is available from Aslib price 50*s* to members and bona fide students and 63*s* to others. Students who wish to make use of this special price offer must order through their college or school. An order form is enclosed with this issue.

Scottish Branch

After a civic reception by the Lord Provost and magistrates in the City Chambers, the Annual General Business Meeting of the Scottish Branch was held in the Salutation Hotel, Perth, on 16th March. The office-bearers were re-elected with the addition of Mr W. H. Rutherford, Royal Society of Edinburgh, as Hon. Assistant Secretary. This post was created to relieve the secretary of some of his duties. The places of Miss Luke and Mr C. G. Wood on the committee have been taken by Mr J. Lea, Chapelcross Works, UKAEA, and Mr W. Anderson, Scottish Horticultural Research Institute. The Secretary's report and the Treasurer's balance sheet, which showed a healthy credit, were approved.

The first residential conference of the Scottish Branch which followed was opened with a paper by Dr Archie Clow, producer in charge of the BBC Science Unit, who spoke on 'Communication in science'. During the afternoon Mr G. N. J. Beck, Assistant Editor of *Endeavour*, spoke on the 'editorial function', covering choice of subject of articles, commissioning of authors, and foreign language editions. Mr D. Ainslie Thin of Oliver and Boyd, spoke on publishing scientific and technical material, discussing layout, text, illustrations, and typefaces in some detail. He outlined the history of a book from its inception until it went out of print. At the close of the afternoon a lively discussion took place with the three speakers acting as a panel.

As the number attending was smaller than expected and the men outnumbered the women by three to one, the dance scheduled for the evening was cancelled, but discussion continued. On Saturday morning an illustrated lecture on binding library books was given by Mr David Moncur of Dunn & Wilson, and Dr D. J. Urquhart, of the National Lending Library, talked about the availability of foreign material at Boston Spa and of translations from the Russian. Apart from the number attending, it was a satisfactory and historic first residential conference and was enjoyed by all, including those who came a longish distance for the Friday meetings only.

Information Retrieval in Action

Mr C. W. Cleverdon, Director of the Aslib Cranfield Research Project, is one of the speakers at the conference on 'Information Retrieval in Action' being held from 18th to 20th April in Cleveland, Ohio. Mr Cleverdon's subject is 'The Cleverdon-Western Reserve University experiment'. In this experiment, the retrieval of material documented by Western Reserve University mechanized systems is tested by methods used in the second phase of the Aslib Cranfield project.

Zinc and Lead Information

An expanded Library and Information Service for Zinc and Lead has been inaugurated by the Zinc Development Association and Lead Development Association at 34 Berkeley Square, London W1. The new service aims at providing research workers and users of zinc and lead with comprehensive coverage of technical literature from all published sources and is supported by the American Zinc Institute, the Lead Industries Association, and the AZI/LIA Expanded Research Program, New York. Two monthly bulletins, *Lead Abstracts* and *Zinc Abstracts* are a feature of the service and are distributed free of charge, with annual subject and author indexes. Loan slips are included in *Abstracts* sent to readers in the UK, who can borrow any material referred to in them from the library. A new Uniterm index using Vistem cards has been introduced in the library to enable references to specialized information to be traced quickly. Complete indexes will be maintained both in London and in New York.

Inquiries should be addressed to the ZDA/LDA Joint Library, 34 Berkeley Square, London W1, or to the American Zinc Institute or the Lead Industries Association, both at 292 Madison Avenue, New York 17, NY, USA.

Institute of Information Scientists

The first examination for Part 1 of the certificate requirements of the Institute of Information Scientists was held in December 1961. There were eight entrants, of whom six were students of the course in progress at Northampton College of Advanced Technology. The following candidates attained the required standard: Miss D. A. Lovett, Mr J. Hill, Mr R. H. Howe, and Mr K. Lavanchy.

New Nuclear Science Glossary

The British Standards Institution has recently published a new *Glossary of terms used in nuclear science* (BS 3455:1962). This standard is the result of years of careful preparation and should be the means of reducing—if not eliminating—many ambiguities of terminology which have grown up during the rapid development of this field of knowledge and, it is hoped, of preventing introduction of new ones. Apart from its usefulness to those already working in nuclear science, the glossary should prove invaluable to students. BS 3455:1962. *Glossary of terms used in nuclear science*, is available from British Standards House, 2 Park Street, London W1, price 30*s*.

Department of Scientific and Industrial Research

A factual account of the origin, development, organization, and activities of DSIR, prepared by its present chief, Sir Harry Melville, has recently been published. It should meet the needs of scientists and industrialists from other countries who wish to learn how DSIR works and what fields of research it covers. As a reference book it should be useful to public and technical libraries as it presents the relevant facts clearly in one well-indexed volume. *The Department of Scientific and Industrial Research* is published in London by Allen & Unwin, price 25*s*, and in New York by Oxford University Press.

Management and Control of Research and Development

The Office of the Minister for Science has recently issued a *Report of the Committee on the Management and Control of Research and Development.* Although the work of this committee was specially directed towards Government departments and Exchequer-financed bodies, including the Atomic Energy Authority, the repercussions were very wide and the importance of this report for general research organizations is apparent. There is a chapter on the organization of Government science and three on civil research and development, covering basic research, applied research and selection of projects, control and dissemination of results. The second main part of the report deals similarly with defence research and development and the last two chapters deal with the organization and problems of staff management. *Report of the Committee on the Management and Control of Research and Development* is published by HMSO at 7*s*.

Industrial Research in Britain

The fourth edition of this well-known reference book has recently appeared. It is broadly similar to the third edition, published in 1956, but much has been rewritten and new sections have been introduced covering sponsored research organizations, scientific attachés, data-processing services, translations of Soviet scientific and technical periodicals, and technical libraries. Probably the most valuable section for many readers is that on the research activities and facilities of industrial firms, because the information given is virtually unobtainable elsewhere. There are 291 entries in this section and, wherever possible, figures for research expenditure and number of qualified staff are given as well as information about the scope of research. *Industrial research in Britain*, 4th edition, is published by George Harrap, price 4 guineas.

European Chemical News

A new weekly periodical entitled *European Chemical News* made its first appearance in January. This is the first specialist journal to cover technical and commercial aspects of the European chemical industry. The first issues should be of special value to market research specialists and chemical development managers, and it is hoped that the editor will be able to maintain a constant flow of reliable, up-to-date information. *European Chemical News* is published by Temple Press at 52*s* p.a.

'Muret-Sanders' revised

A new edition of the well-known Muret-Sanders *Encyclopaedic dictionary of the English and German languages* is being prepared by the firm of Langenscheidt, working with a team of scholars in Britain, USA, Germany, Austria, and Switzerland. It will be published in two parts of two volumes each by Methuen & Co. Ltd, 36 Essex Street, London WC2.

Directory of Telex Libraries

The Research Sub-Committee of the Reference, Special, and Information Section of the Library Association is compiling a second edition of its directory of libraries available by Telex. Librarians who have access to Telex but who have not yet received a questionnaire from the Section are asked to contact Mr A. J. Illes, University Library, Cambridge.

International Science Information Studies

The first three publications in a new series of International Science Information Studies, sponsored by the National Science Foundation, Washington, have recently appeared. The object of the studies is to 'survey geographic areas of interest from the point of view of the published results of their scientific research, organizations of scientific and technical importance, and available science information services'. The reports will include lists of scientific institutions and organizations and relevant published literature.

The three published studies are: 1, *Scientific facilities and information services of the Republic of Indonesia*; 2, *Scientific facilities and information services of the Federation of Malaya and State of Singapore*; and 3, *Scientific facilities and information services of the Republic of Viet-Nam*. They are available from the Pacific Information Center, Bernice P. Bishop Museum, Honolulu 17, Hawaii, at $1 (7*s* 2*d* approx.) for the study on Indonesia and 50 cents for each of the others.

International Congress on Reprography

The First International Congress on Reprography will be held in Cologne in October 1963. It will be organized by the German Society for Photography with the object of bringing together research workers and specialists from various countries who are engaged in the development of facsimile reproduction processes to discuss their experience and plans. It will also offer users of reprographic methods an opportunity to learn of new processes and their applications. An exhibition will be arranged, concurrently with the congress, at which manufacturers from various countries will demonstrate their latest products. Papers will be given on technical principles, delivered broadly into three sections: processes using silver salts, processes not using silver salts, and printing processes such as offset-lithography; and on fields of application, divided into five sections: public administration; economic affairs; education, science, and research; filming as a safeguard; combined techniques; and special matters including copyright, authenticity, and permanence. The congress languages will be English, French, and German. Offers of papers for any of these sections should be made by 1st June 1962 to Internationaler Kongress für Reprographie, Neumarkt 49, Cologne, West Germany.

Iaslic Conference

The fourth conference of the Indian Association of Special Libraries and Information Centres (Iaslic) was held in Jealgora, Bihar, from 14th to 17th February. Resolution 3, adopted by the conference, recommends that 'In view of the increasing collaboration of non-English-speaking countries with India, it is resolved that the Government of India may kindly be requested to take necessary steps to open Scientific Liaison Services in the capitals of all such countries, manned by adequately qualified scientific personnel possessing the requisite knowledge of foreign languages to ensure mutual dissemination of technical and scientific information.' Recommendations made at the symposia include the establishment of an 'International/National' organization for screening research material prior to publication, adoption of an international language for easy scientific communication, and establishment of a National Central Science Library to work in close collaboration with the National Documentation Centre (Insdoc) and form a counterpart to the National Library of Calcutta which covers the humanities and social sciences.

Uganda Documentation Centre

It is reported that Mr W. L. Saunders, Deputy Librarian at the University of Sheffield, has been seconded for one year to Makerere College, Uganda, under Unesco auspices, to establish an educational documentation centre there.

Waverley Essay Competition

Research is again organizing the Waverley Gold Medal Essay Competition this year in order to encourage clear presentation of new scientific work in a form which may be readily understood by scientists working in other fields and by laymen. The first prize is the Waverley Gold Medal and £100 and there are two other prizes of £50 each. Entry forms can be obtained from the Editor, *Research*, 88 Kingsway, London WC2. The closing date for receipt of entries is 31st July 1962.

Concepts and Problems of Libraries of the Future

An investigation of the bases of library work and of methods which will be employed by libraries of the future has been sponsored by the Council of Library Resources in a $162,258 contract. The director of the project is Dr J. C. R. Licklider, a psychologist. The investigation will attempt to lay the bases for further research by: 1, developing a quantitative functional description of libraries as they now operate; 2, formulating a statement of the functions that should be fulfilled by library systems; 3, examining related sciences and technology which now support or which may support library operations and selecting from these areas for research and development; 4, making a fundamental analysis of aims, methods, and problems in information storage and retrieval and in memory organization; and 5, performing research on problems in man-machine communication and in 'artificial intelligence'. The first phase of the study is expected to be completed in October 1962, and it is proposed to publish the results of the studies as they are completed.

NEW MEMBERS

CORPORATE

Name	*Locality*	*Representative*
Eastleigh Technical College	Eastleigh	M. H, Wilson
Farmers' Weekly	London	
George Forbes Memorial Library	New Zealand	J. A. Frampton
Liebig Research Centre	Brentford	C. O. Essex
Liverpool University	Liverpool	D. A. Clarke
Molins Machine Co. Ltd	London	E. J. L. Smith
Norsk Spraengstofindustri A/S	Norway	
Small & Parkes Ltd	Barking	A. Jenkins
War Office	Shoeburyness	Mrs P. Pressler
Welwyn Electric Ltd	Bedington	G.D.Henderson
Yale & Towne Manufacturing Co.	Willenhall	T. L. Pace

NEW MEMBERS—*continued*

INDIVIDUAL

Name	*Location*
D. Bullivant	London
F. J. Goldie	Scotland
E. M. Robinson	London
Mrs A. Skourtsi	Greece
Dr K. Singer	Hong Kong

THE LITERATURE OF FILM LIBRARIANSHIP

SAM KULA

Deputy Curator, National Film Archive

LET me begin by reassuring you that this paper is not a survey of the literature of the film. The library of the British Film Institute contains just over 10,000 books and pamphlets relating to the film, and even a hasty survey of a body of literature of that size and complexity would occupy us all night. Most of this literature, moreover, falls outside the scope of the bibliography I am compiling on which this paper is based: a bibliography of film librarianship. My subject this evening, therefore, is limited to the literature that deals in some measure with the art, the science, or, if you prefer, the discipline of film librarianship; the collection, organization, and treatment of films in libraries. That there is such a discipline is, I think, warranted by the existence of this group, and if there are still some unbelievers in that great grey sea of librarianship beyond Aslib, I trust the Cataloguing Code that has been so methodically (I almost said painfully) formulated at the fortnightly sessions of your Cataloguing Committee will be fully recognized as the birth certificate of a new and vital branch of the 'penurious science'.

Film libraries are as old as the film industry itself. The earliest production companies developed film libraries of their own products, and the trade catalogues they issued indicate that because of the brevity and variety of their films they were organized in rough subject order. A Warwick Trading Company catalogue of 1898, for example, offers Lumiere films under such diverse headings as descriptive street scenes; juvenile subjects; historical subjects; military views; railroad and steamship subjects; panoramas (taken from a moving boat or train); aquatic sports and general views; dances, divided by national origin; combat and ring sports; humorous subjects, etc. When one considers that the average length per item was probably no more than fifty feet, these libraries were in fact the first stock material libraries as well as the first film libraries. Add the fact that until about 1908 the producers sold their films outright rather than renting them, and the comparison is even closer. With this in mind the Robert W. Paul catalogue of 1898 might easily serve as a model of a stock material catalogue. True the items offered are only divided into five categories and one of these is 'new miscellaneous films', but this would not, I suspect, upset some of our less ambitious colleagues. The titles, moreover, provide a fairly clear indication of the film's content, so that the five items under 'railway pictures', for example, are called Forth; Monorail (a timely item that would have proved useful for the recent televised surveys of this new and revolutionary form of rail transport); Northern; Trains; Trolley; Electric. Another feature is that most of the items were accompanied by an enlarged still or group of stills from the production itself so that the prospective customer could decide whether the *mise en scène*, style of photography, or time of day suited him. A modification of this technique, using frames from the shots clipped to entries in a sheaf catalogue, is used by several stock material libraries today.

I am not suggesting that these early trade catalogues form part of the literature of film librarianship; they belong more properly to the literature of the film; but they form part of the documentation on the history of film libraries that must be collected and preserved if that history is ever to be written. There has only been one attempt, to my knowledge, to summarize the contribution that can be made by film libraries to the world of learning, and that is Sir Arthur Elton's admirable address to the Aslib Conference in 1955 which appeared in *Aslib Proceedings* in November of that year.[1] Elton's pioneer study had the primary aim of establishing the film's place as a source material for history, but in doing so (to my mind, with complete effectiveness), he also described in some detail the main sources for film in Great Britain. It is, in fact, the basis for an historical analysis of the development of film libraries and their significance as a storehouse of human records. Elton surveys the existing film libraries in a section entitled 'Accumulation Unregulated' in which he briefly describes the operation of the BBC library, the COI Films Division, the National Coal Board library, the National Film Archive, the Imperial War Museum, the three Service film libraries, and the four newsreel libraries which then existed: British Movietonews, British Paramount News, Gaumont-British News, and Pathé News. What one searches for in the literature and does not find are detailed accounts of the history and operation of the organizations mentioned above. Aside from several accounts of the National Film Archive and one account of the BBC library there is, to my knowledge, nothing generally available in print. I think it a fair comment to express a feeling of disappointment on turning up an issue of the *Journal of the Society of Film and Television Arts*, Spring 1960, wholly devoted to news in television and cinema, not to discover an article describing the libraries that play such an important part in making the production of newsreels in both these media possible.

Elton makes no distinctions between stock material libraries, production libraries, research libraries, and archives and, in so far as most of the problems connected with the operation of differing types of libraries are common to them all, no distinction will be made here. Definitions of the different types are difficult because many libraries carry on several functions and overlapping is frequent.

The Cataloguing Committee, in the preface to its Code, lists eight distinct kinds of film libraries: distribution, documentary production, feature production, government, government research, national archives, newsreel, and television. Production libraries, however, keep complete films and the cuts and overs which form stock material. Newsreel libraries keep the complete items and stock material resulting from cuts and overs or material specially filmed for future use. The same is true of television libraries. The BBC keeps new accessions in their Current Library, and when a decision has been taken to retain them permanently, transfers them to the Permanent Library or Archive. The

Shell Film Unit keeps stock material in their Stock Shot Library, and completed films in their Film Library. The National Film Archive restricts its intake to complete films as a matter of policy, but accepts newsreels and fragments of historical interest which in length may approximate stock material, and if someone were to come forward with the cuts from *Greed,* or the overs from *Intolerance,* they would not be turned away. A very confusing situation. There are factors, primarily concerned with ultimate intent, that serve to distinguish archives from film libraries in general, but they need not concern us here. The library techniques remain the same.

An account by Dorothy Stone of one of the earliest stock material libraries appeared in *Films in Review,* August–September 1951.[2] The author's father, Abram Stone, started a stock material library in New York in 1908. Based on his private collection of films, the Film Library, as it was called, secured films from a variety of sources, and over the years developed most of the techniques employed in stock material libraries today. His earliest promotional literature, dated 1908, is of some interest as it indicates that he had fully worked out the function of a stock material library before he opened his doors.

THE FILM LIBRARY—THE BIRTH OF AN INSTITUTION

> 'Ingenious and resourceful as directors have proven themselves to be in the development of films in America, they have all found themselves checked or halted for lack of an "action" or "effect" required by a scenario.
>
> 'A startling effect can sometimes be produced simply at a trifling cost, while a simple effect can sometimes only be produced at a startling cost and no end of trouble.
>
> 'The birth of a new Institution, The Film Library, will therefore be greeted with satisfaction by directors who may turn to it as the newspaper reader turns to its Index, or as the Author, Playright or Costumer turns to the library reference room for data.
>
> 'A film library with an intelligently collated selection of Stock Scenes such as departing or arriving vessels, explosions, sunsets, wrecks, parades, animals, foreign cities, street and native scenes, storms, personages, crowds, and many others with which a director can strengthen a weak scenario, will be highly rated and well patronized.'

Stone adopted a one-price policy for all his stock material regardless of the use to which it was being put. At '$1 for each foot of film copied from the negative, with a $25 minimum' Stone was innovating the charge per foot. When the film industry moved west the Film Library found it impractical to ship original negatives and developed the 'scratched print' (on which scenes required could be marked-up and printed to order from the negatives) which served the dual purpose of protecting original negatives from the hazards of the cutting room. Operating before the development of air mail, Stone's customers in California must have been exceedingly patient producers with leisurely schedules. The Film Library flourished in the twenties but competition from newsreel companies and the coming of sound forced it into a decline from which it only recovered with the advent of television.

Although Stone and his successors and competitors succeeded in establishing the production library as a valuable adjunct to film making, the value of the film itself was only slowly appreciated by educators and research workers. Film has been engaged in an uphill struggle for recognition as a source material for history, as a record worthy of library and archive attention, and as an educational and informational tool that is still in progress. The earliest reference to film in library literature which readily comes to light is an article by Alexander Philip in the *Librarian;* May–July 1912, entitled 'Cinematograph films: their national value and preservation'.[3] Philip considered the film in general terms as an important source of historical information, and proposed the formation of a national museum of motion pictures based on the collection of Charles Urban, a leading film-maker of the time, which had just been offered to the nation. A remarkably enlightened article that did not, unfortunately, lead to any concrete action. The library literature that followed tended to consider films exclusively as a new tool to be used in school and adult education and various aspects of community service, which included the recruitment of librarians. Orrin Cocks' article in the *Library Journal,* September 1914, entitled 'Libraries and motion pictures: an ignored educational agency'[4] was more typical of the attitude that prevailed. Films in public, school, and university libraries were gradually submerged under the term 'audio-visual aids' and the available literature is dominated by descriptive examples and enthusiastic advice on the treatment of non-book materials in these libraries.

The literature traces the growing use of film in libraries, but primarily for education and community service. The general level of the contributions on film librarianship, however, never rises beyond, to take an example, 'How to run a film library',[5] an undated pamphlet turned out by Encyclopaedia Britannica Films Inc. The contents include a paragraph suggesting that it might be a good idea to keep the films in alphabetical order, another suggesting that the title of the film be added to both the tin and the film lead, and an outline of an issue and film checking service. I do not mean to criticize this and the countless pamphlets and articles that have appeared at this level. It does what it sets out to do admirably in providing a practical introduction to films for librarians who have never, perhaps, handled a film before. Robert Collison's manual for Aslib, *Treatment of special material in libraries,* published in 1955,[6] sums up current thought on the treatment of audio-visual and other special materials, and provides a chapter on film which should satisfy the needs of a general library with a small collection of films.

Serious consideration of the techniques of film librarianship in the professional literature had to await the serious consideration of film in libraries, at a level beyond the distribution of educational and informational films through school and public libraries. This did not occur until after the formation of national archives and film museums. Thus the treatment of films as a part of a permanent collection was described by John Abbott of the Museum of Modern Art Film Library, in the *Library Journal* in 1938,[7] and the work of the National Film Archive by Ernest Lindgren, in the *Museums Journal*[8] the same year. A general survey of the film archives and museums of the world and an account of the development and function of the International Federation of Film Archives, was contributed by Lindgren to the Golden Jubilee Edition of *Kinematograph Weekly,* 5 September 1957.[9] More detailed descriptions of the operation and organization of individual film archives and museums may be found scattered through the literature of the film. Among the more noteworthy are: a description of the work of the Soviet Film Archive which appeared in *Deutsche Film Kunst,* no. 8, 1959, and no. 2, 1960;[10] a short account of the East German Archive by its Director, Herbert Volkmann, in the same journal, no. 2, 1959;[11] a description of the French Film Archive by Jean Grémillon, its President, in *Cinématographie Française,* 5th July 1952;[12] another account of the same organization by Lotte Eisner in *Filmkunst,* no. 13, 1954;[13] an article on the importance of film archives with an impression of an ideal film archive by Ernest Lindgren in the *Penguin Film Review,* no. 5, 1948;[14] and a general evaluation of the function of film archives by James Card, Director of Eastman House, Rochester, NY, in *Image,* June 1958.[15]

In his article Card discusses the career of Boleslas Matuszewski, who was appointed Royal Court Cinematographer to Czar Nicholas II in 1896. Two years later, and just two years after the commercial exploitation of cinematography began, he was in Paris arguing for the preservation of film records in an international chain of film archives to embrace all the world! He apparently received an enthusiastic reception but, like all such pleas, plans, and programmes which appeared intermittently for the next thirty-seven years, Matuszewski's scheme was never actually implemented. Neither the National Film Archive in London nor the Museum of Modern Art Film Library in New York, the first film archives, was established until 1935.

A particularly useful account of the organization and administration of a general film library and information centre is provided by Beatrice Trainor in a pamphlet published by the Canadian Library Association in 1960.[16] This is a description of the library of the Canadian Film Institute which is modelled to some extent on that of the British Film Institute, Miss Trainor having served as Librarian and Information Officer with the Institute before carrying the gospel to the New World.

It is appropriate that Abbott entitled his article on the Museum of Modern Art Film Library 'Cataloguing and filing of motion picture films'. Cataloguing is the problem that predominates in the literature of film librarianship. To judge by the available literature it is the *only* problem in film librarianship. Whatever their function, all film libraries must record their holdings. Cataloguing is the library technique that concerns them all, and it is in the efficient adaptation of cataloguing and classification techniques to film problems that film librarians have most to learn from the literature and from each other. It is, therefore, all the more regrettable that nowhere in the literature does one find a theoretical analysis of film cataloguing. The literature that does exist takes the form of working descriptions of existing systems and the three published codes.

An excellent starting point would be Bernard Chibnal's account of the Shell Film Unit Stock Shot Library which appeared in *Aslib Proceedings,* May 1952.[17] The operation of a stock material library is described in general terms, with particular attention to the problems of selection. At Shell the stock material is classified by UDC, and at the time Chibnal was writing a scheme was being considered whereby a positive transparency of the shot or sequence was attached to the catalogue card to supplement the verbal description. In 1946 Carl Effinger described this procedure in use at the stock material library of Twentieth-Century-Fox in Hollywood. In an article in the SMPE *Journal,* February 1946,[18] Effinger describes a loose-leaf catalogue using identifying frames from the stock material attached to each entry. The entries themselves are not classified but are filed in alphabetical subject order. The entries are based on review sheets which are made out at the time of selection. The main subject categories are divided into arbitrary sub-categories and further divided by descriptives or qualifiers; the whole collection is then broken down into four main divisions called, 'dawn, day, dusk, and nite'.

The National Film Board of Canada's extensive stock material library is described by Elizabeth Ketchum in the *Canadian Library Association Toronto Chapter Bulletin,* May 1956.[19] Organized in accordance with the Film Board's own subject scheme, the entries are filed in large sheaf catalogue volumes for consultation throughout the building.

The operation of the US Navy Film Library, a stock material library, is described by Gerald Sarchet in the SMPE *Journal,* May 1947.[20] The material is viewed, review sheets are made out, and the catalogue entries are based on these sheets. The order is by subject based on their own scheme. The normal procedure in film libraries is to arrange the catalogue entries in a variety of ways, classified or unclassified, but to store the films under some system of numerical or alphabetical notation. One of the few libraries to store the films themselves in classified order is the Moody Institute of Science in Los Angeles. This stock material library is described by Lewis Humphrey in the SMPE *Journal,* September 1955.[21] The entries are classified by a modified Dewey using Sears subject headings and the film itself is stored in 400-ft rolls in classified order.

The only account of a television film library available is by Ewart Davis who described the organization of the BBC Film Library in *British Kinematography,* December 1958.[22] This is the only film library of which I am aware that uses a strip index as a subject index. The use of two stages in library ascessions is also, I imagine, somewhat unusual. When first received, a film forms part of the Current Library. Only when it has been selected for permanent retention is it subject-indexed. The strip subject index itself is divided into two sections; 'Personalities' and 'General'. The use of different colours to indicate copyright restrictions is another feature of this and other libraries.

The treatment of film in a research library is described in an account of the Royal Aircraft Establishment Film Library at Farnborough by I. Graham and G. Crowther published as a Technical Memorandum by the Ministry of Supply in 1959.[23] A brief description by Crowther appeared in *Aslib Proceedings,* July 1959.[24] Because the film accessioned results from experimentation carried on by the Establishment it is possible to commence cataloguing, in effect, at the time the film is shot—by having the experimental team fill in a form from which the librarians can prepare their entries. A main subject index, classified by UDC, unit entries, and nine supplementary indexes enable the Establishment's film librarians to impose a measure of order on the complex material that results when film is used as a research tool.

In connection with the classification of aviation films, it is interesting to note that Elton in his paper to Aslib described the making of *Powered flight,* Shell's compilation film on the history of aviation. In his description he refers to Adrian de Potier's classification scheme for the Royal Aeronautical Society. Has this ever been published, or is it available in any form?

The classification of scientific films is also discussed in a pamphlet called 'The classification, appraisal, and grading of scientific films', published by the Scientific Film Association in 1946.[25] When I say discussed I really mean that mention is made of a study of the subject-classification of scientific films being undertaken by the Association and the Library Association. In the discussion following Elton's talk some nine years later, J. D. Stewart mentioned that he had served as chairman of a group of committees which were considering the cataloguing of materials other than books. The minutes of the meetings, it would appear, are still at Chaucer House, but the information accumulated and the decisions reached have never seen the light of print. The Association's pamphlet is primarily devoted to the appraisal of films, which is not properly the work of film librarians but must, as at the National Film Archive for example, rely on the opinions of subject experts. The catalogue entries should, however, include references to the appraisals or, as in the example provided in the Association's pamphlet, include the appraisals themselves. Another discussion of this problem is provided by Adolf Nichtenhauser and David Ruhe in an article called 'The critical cataloguing of medical films' which appeared in the *Journal of Medical Education,* May 1951.[26]

An interesting analysis of the problems involved in cataloguing various types of films, and one of the few contributions to the theory of film cataloguing, appeared in the *American Archivist,* July 1945.[27] The author, John Bradley, based his discussion on the experience of the National Archives in Washington, and suggests the need of a list of priorities determined by the potential use of a catalogue. The catalogue card should not, he suggests, 'be made to carry too much of a load and thus become inarticulate', and he warns against film cataloguers attempting the impossible and trying to 'anticipate all the needs of all the searchers for all time on all the film in custody'.

There are, it would appear, no accounts of the operation of newsreel libraries, although the National Broadcasting Corporation published a handbook to their newsreel and television library in New York in 1958.[28] The cataloguing of newsfilm in the National Film Archive was described by David Grenfell in the *University Film Journal,* Summer 1955.[29] Other accounts of cataloguing in the Archive by Grenfell appeared in the *News Bulletin of the International Federation of Film Archives,* June 1955,[30] in which he warns about 'faked' newsreels that occurred occasionally in the early days of cinematography; and in *Librarian and Book World,* April 1958.[31]

The cataloguing rules of the Archive have been published since they were first formulated in 1951 by Joan Fulford and Diana Waller. The fifth revised edition, under the hand of David Grenfell, the Archive's Chief Cataloguer, appeared in 1960.[32] It described in detail the procedure followed by the Archive, the adaptation of UDC to film classification, and the form of catalogue entry adopted by the Archive. An interesting evaluation and analysis of the third edition of the Archive's rules by Bernard Chibnal appeared in the *Journal of Documentation,* June 1955.[33]

In 1951 a conference of film librarians was held in the United States (at which the Archive was not represented) which led to the formulation of a set of film cataloguing rules by the Library of Congress. These appeared as 'Rules for descriptive cataloguing of motion pictures and film strips' in a preliminary edition in 1952 and were re-published the following year in a second preliminary edition.[34] These differ from the Archive rules in several important respects, notably in the choice of title for main entry. The Library of Congress recommends that each language version of a film should be entered under the title at hand. The Archive recommends that the main entry should be under the original release title in the language of the country of origin. In 1956 Unesco added the third of the three film cataloguing rules in general use throughout the world. Based on the Archive's second edition and the Library of Congress's second preliminary edition, and agreeing with neither in many important respects, the Unesco '*International rules for the cataloguing of educational, scientific, and cultural films and film strips on 3 in. by 5 in. cards*' appeared in a preliminary edition in May 1956.[35]

In the hope of preventing further additions to the number of rules available to the growing body of film librarians, Grenfell made a strong plea for standardization in film cataloguing which appeared in the *Journal of Documentation,* June 1959.[36] The result of that plea was the Aslib Film Production Librarians' Group Cataloguing Committee which is now bringing a code for use in all types of film libraries to publication. One of the most valuable assets of the new code, and one which should commend it to many film librarians, is the list of definitions appended. This should provide, for British film librarians at least, a definitive terminology for film cataloguing, whatever the form of entry employed.

Two other problems of film librarianship which have been reflected in the literature are film storage and film copyright. The material available, is, however, sparse enough. On the subject of film storage the most useful exposition of the problems, combined with the National Film Archive's solutions, is that by Harold Brown which appeared in *British Kinematography,* May 1952.[37] This also describes the artificial ageing test which the Archive employs to maintain a chemical surveillance of nitrate films.

The test was developed by G. L. Hutchinson, L. Ellis, and S. A. Ashmore and appeared as a joint report of the Ministry of Supply, Explosives Research and Development Establishment and the Department of the Government Chemist, called the *Surveillance of cinematograph record film during storage,* in 1948.[38] A consideration of the problems in storing nitrate film and the construction of vaults for that purpose by John Bradley appeared in the SMPE *Journal,* August 1949.[39] A useful handbook on handling and storing motion picture film by the Kodak Motion Picture Film Division appears in the *Eastman motion picture reference book,* published in 1958.[40]

On the subject of film copyright this survey should include almost everything in the extensive literature on copyright and libraries, not to mention the vast legal literature on the subject. That it does not do so is not a reflection of my attitude to the importance of copyright considerations. At the National Film Archive it occupies much more of our time than we can honestly afford and causes more concern than all the storage problems combined. There are three books which have useful sections on the copyright of films: Samuel Spring's *Risks and rights in publishing, television, radio, motion pictures, advertising, and the theatre,* 1952;[41] John Eddy's the *Law of copyright,* 1957;[42] and W. J. Leaper's *Copyright and performing rights,* 1957.[43] An interesting symposium on copyright appeared in the *Journal of the British Film Academy,* Summer 1956.[44] Under the title of 'The film-makers rights in his work', Roger Manvell discussed the main problems, K. R. Lockhart-Smith discussed the legal position, and Thorold Dickinson added a film-maker's comments.

In attempting to summarize the discursive chaos of this paper only one coherent thought emerges. The literature of film librarianship is hopelessly inadequate, but it does exist. Its prime defect is the almost total absence of published theory, so that every author on the subject prefaces his paper with 'in the beginning was the word'. What is obviously needed is a point of reference, so that film librarians will not be forced continually, and occasionally laboriously, to explain who they are and what they are before considering the problem at hand. What is needed, in fact, is a manual describing the basic functions of film libraries and incorporating the not insignificant corpus of established technique. A manual to which many film librarians will take exception, but on particular points, using the main body of the work for either ammunition or defence. The Cataloguing Code is the first step in responsible film librarianship. The next one must be the publication of a manual of procedure that will act as a guide to this new and demanding discipline.

This paper is based on a talk delivered to Aslib Film Production Librarians Group on 10th January 1962. For much information, criticism, and help I am indebted to Mr David Grenfell, Chief Cataloguer of the National Film Archive.

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SATISFYING A DEMAND OR CREATING A MARKET

H. R. HEAP
Managing Editor, Engineering News

Aslib Engineering Group meeting, 11th January 1962

IN approaching the subject of technical publications, it is important to stress that the business of publishing technical information should not be confused with journalism in the form of national or local press. The journalist writes primarily to entertain, whereas the technical publisher aims to inform his readers.

When starting a new technical publication, the first operation is to send out a circular letter to all the large companies, asking for their support and co-operation in sending in news items and technical information. In the case of *Engineering News* approximately 25,000 letters were dispatched to all parts of the world and these brought many thousands of replies, most of them welcoming the new publication and promising support. One of the replies, from a professor in South Wales, contained the following statement: 'There is far too much paper in the world and, in my view, there is no excuse for inflicting a further publication on an over-saturated public. I am, therefore, not willing to co-operate in the way you suggest'. Although this was the only letter that openly challenged the wisdom of starting a new publication, publishers normally incur considerable verbal response when a new publication is suggested. The normal reaction is that there are far too many technical publications already and many readers complain that they do not have time to read even the existing publications, let alone any new ones.

Our Company has started a new technical publication every year for the last seven years and all of these have been successful. On this evidence, therefore, it does not appear that the publishing industry is over-producing. Technical publishing is really a closed-loop system:

1. There must be a large number of readers.
2. In order to achieve this, a journal must cater for their specific needs and be well produced.
3. In order to achieve this, the production costs must, inevitably, be high.
4. In order to pay the heavy costs, considerable advertising must be attracted.
5. In order to attract advertisers, there must be a large number of readers.

etc., etc., etc.

In order for a publication to remain in business, this link must not be broken, so that if there are too many journals for too few readers or if there is not enough advertising to maintain all the journals some of these publications must cease. In this way, the technical publishing business is subject to automatic control.

In spite of this, there is a common feeling that there are too many publications and it is interesting to speculate on the reasons for this impression. The specialist interested in a particular field—such as plastics, metallurgy—might sensibly read two or three specialist publications dealing with his subject, and in order to keep abreast of allied fields, he might feel it desirable to read one other publication with a wider coverage. The senior engineer, however, who is, superficially at any rate, interested in a very wide range of technical subjects is fair game for the circulation promotion departments of a number of publishers. He will undoubtedly be inundated with requests to subscribe to a very large number of journals. If he is sensible, however, he will make no attempt to read the detailed technical publications dealing with all aspects of his work. In practice, senior engineers are extremely busy people and a great many admit that they do not read any publications at all because, in order to keep in touch with developments, it would be necessary to scan very quickly a very large number of publications and probably less than 10 per cent of what they saw would be of interest to them. It is to cater for these senior and busy engineers that the newspaper format has been developed. Indications are that this is a very popular way of presenting technical developments for the man who has little time to read. It has also been discovered that a newspaper develops different reading habits from a glossy journal. Whereas a glossy journal is normally taken on subscription by companies and circulated to the individuals in the company, a newspaper is so cheap that a large number of engineers are prepared to take out a personal registration. This means that copies are posted direct to their homes and these can be scanned quickly in a few minutes in bus or train. Furthermore, the presentation of the paper is styled for easy reading, so that no great conscious effort is required on the part of the reader. The newspaper does not aim at replacing the glossy journal, which must still be the main source of information for the specialist and the younger engineer.

ORGANIZATION

A technical publication is organized on very much the same basis as a manufacturing company in that three main processes must be carried out. Firstly, the raw material must be obtained, secondly, this raw material must be processed and, finally, products have to be sold. In the case of publications, the selling effort is divided between selling the completed journal and selling advertising space. As in a manufacturing company, a constant watch must be kept on costs. Publications, as with products, must be kept up to date in their style and in the service they give, and an active sales policy must be pursued at all times.

Inevitably, there is a certain wastage in both readership and advertising, and this must be made up continuously if ground is not to be lost. Wastage among readers is due to people leaving the industry, dying, or being promoted to less technical activities but, on the other hand, new generations of engineers are appearing from universities and colleges at an ever-increasing rate. On the advertising side, certain companies withdraw from time to time, having saturated the particular field of readership covered by any one journal.

The first stage in starting a new publication, as with a technical product, is design—and the design of a publication is carried out with a particular type of reader in mind. For instance, *Engineering Materials & Design* covers a very wide range of subjects but this is justified because it is aimed at the engineering designer, and in choosing material for publication, the critical question is—would this interest the designer?

The second stage in starting a new publication is to carry out a market survey on advertisers. Design and marketing must always be considered together, because there is no point in designing a publication for which there is no market and, in this sense, the market includes advertising. It should be strongly emphasized that editorial and advertising departments are kept completely separate. In most reputable British companies this policy is strictly enforced in order to ensure that the editorial staff are free to publish whatever they think of importance to the reader without pressure from the advertising side. This does not mean, of course, that having given a firm editorial mention the advertising side cannot bring pressure to bear on the firm mentioned in an effort to persuade them to advertise subsequently.

The third factor in starting a new publication is the selection of staff. For a purely technical publication, we believe that technically qualified men with from fifteen to twenty years experience in industry should form the nucleus of the editorial team. It is easier to train an engineer in journalism than to teach a journalist engineering, but the most important factor is that, having lived in the industry, the editorial staff will know how engineers think and what they like. All editorial matter must be presented from the reader's point of view. It is necessary, in presenting technical information, to make judicious use of the journalist's tricks of the trade. Facts are often extremely dull and must be dressed up to make them interesting to the reader. This process is like cooking, and in the same way that a diner will finish a well-cooked meal with a general sense of satisfaction, without realizing exactly what treatment has been given to the food, so the reader should have the general feeling of being interested in what he has read without being aware of the process which has been carried out on the original data. As with cooking, the treatment of technical information can be easily overdone and it is vitally important that facts should not be distorted or over-emphasized. Here again, it is important that editorial staff of an engineering publication should, basically, be engineers, in order that they can judge the merits of a particular story and present it accurately.

The fourth state in presenting a new publication is to make it known by direct mailing to companies and organizations which are likely sources of news and information. It takes several years to build up a satisfactory network of correspondents and, until this has been achieved, it is necessary for the editorial staff to keep a continuous watch on all the activities which have any bearing on the publication. Useful leads can very often be picked up from daily newspapers and random conversations on buses and trains. People not connected with publishing often believe that it is easy to produce the first two or three issues of a new publication but that after this the material will dry up. In fact, the reverse of this is true. It is the first few issues which are the most difficult because of the time it takes to become known and appreciated and when this has happened there is usually a superabundance of information which can be published.

A useful source of information is the Reader Inquiry Service card or coupon (the Bingo card), which originated in America but is now firmly established with many British technical journals. On *Engineering Materials & Design,* we receive from 4,000 to 5,000 inquiries a month and this keeps us in close touch with readers and their problems and interests. The cards are carefully analysed to find out what readers are interested in and, in a number of cases, the inquiries result in personal contact with the reader concerned. Technical publishing should be a two-way process—from the journal to the reader and from the reader back to the journal.

Publishing a technical newspaper is a completely different process from the publication of a glossy journal. Firstly, there is very little detailed planning more than one week ahead of publication. This means that all the editorial staff must be flexible in their approach, so that at short notice they can be switched from one subject to another in order to cover up for absence due to visits or illness.

All copy has to be cut drastically in order to fit it into the space available. One of the biggest jobs, and one of the most important, is writing headlines. Many readers get their impression from the headlines alone and it is, therefore, very important that the main facts of the item concerned should be understood by the sub-editor who writes the headlines. Headline writing is an art which which can be only cultivated with considerable practice, the object being to make every headline tell a complete story, and it should, if possible, include a verb. The problem is made more difficult by the fact that for best appearance each headline must contain an exact number of letters and the number depends on the size of type chosen and the number of columns it covers. There is a very large number of long words in engineering, and it is often physically impossible to accommodate the correct word in a given headline; this leads to contractions and slang, such as, 'fridge' instead of refrigerator, but this is, unfortunately, a necessary limitation of the newspaper technique of presenting information.

The other considerations which affect the layout of the paper are:

1. Clash of headlines with one another, i.e., the same word should not appear in two headlines on the same page.
2. There must be no clash between the editorial pictures and the advertising; this may be a clash of products or it may be a clash of subject. It is unwise to have an editorial treatment of a product on the same page as an advertisement by a direct competitor.
3. For illustrations, there is a good and a bad side of every sheet of newsprint. One side is more glossy than the other and gives a better reproduction of halftones.
4. It is important to avoid large slabs of text unbroken by pictures and crossheads. This may mean putting in headings at a point in the story where it may break up the sense or theme. In this case, rewriting may be necessary in order to avoid this difficulty.

Technical publications normally offer their services as a source of general technical information and this can involve the editorial staff in a considerable amount of time and effort. Among the variety of subjects which have been asked for from time to time are the following:

From a Government nuclear establishment—A recommendation for the design and materials for a bellows 3 ft. in diameter to withstand 2,000°C.

From an enthusiast studying ancient music—Information on a craftsman who would be prepared to hand-beat a sackbutt (an ancient form of trombone).

From a Professor of Mechanical Engineering—Details of a development company which does not appear in any of the well-known directories.

In answering the very wide range of questions which we may be asked from time to time, our main object is to pass on the query to an appropriate expert, rather than to give a detailed answer ourselves. All editorial staff have to be continually on their guard against trick questions which are asked not with the idea of getting information, but merely in an attempt to catch us out. All editors are tested from time to time by letters and contributions which are sent in as a form of practical joke and they must be very watchful so as not to get caught out in publishing contributions which are, in effect, nothing more than heavily disguised pornography.

BRITISH UNION-CATALOGUE OF PERIODICALS

EIGHTEENTH (FINAL) REPORT OF THE COUNCIL FOR THE PERIOD 1ST APRIL 1961 TO 24TH JANUARY 1962

The final proofs of the large supplementary volume of the *British Union-Catalogue of Periodicals* were passed for press early in December 1961. With the completion of this volume of 1,030 pages, the compilation of which has been made possible in large part by a generous grant from the Nuffield Foundation, the work for which the Council was constituted in 1944 comes to an end. From January 1962, the responsibility for the continuation of the work has been assumed by the National Central Library.

We can look back with considerable pride on what has been accomplished. The four volumes of the basic *Union-Catalogue*, which were published from 1955 to 1958, have become established as a valuable standard work of reference in libraries throughout the world, and the new Supplement, we believe, will be welcomed as an invaluable guide to the availability of the great mass of research material that has flowed in from every country in the world during recent years. A full account of the inception and subsequent history of the project is contained in the introductions to *BUCOP* and its new supplement.

An undertaking such as this depends for its success on the active participation of many institutions and individuals; and to all who have given such willing assistance in what must be regarded as a striking example of voluntary co-operation in library interests, we offer our thanks.

Our sponsoring institutions and societies, and especially their representatives who have formed our Council, have given continuous support and a great deal of time and thought to the planning and administration of the project. In particular, the Trustees of the British Museum, by providing us with the necessary working accommodation and by opening the full facilities of their great library to our staff, have made a vital contribution to our work; and Aslib, by fostering the project from the outset, and by providing secretarial service throughout, have done much to smooth our path.

Librarians and their staffs have given indispensable help by providing us with the raw materials for the construction of the catalogue. In many cases this has been a considerable task, performed in spite of staff shortages and other local difficulties familiar to all librarians.

To our publishers, Messrs. Butterworth & Co. Ltd, we owe thanks for the unvarying help and consideration they have given to all our difficulties, and to the printers, Messrs. Clowes, for the way they have completed an unusually difficult task.

Finally, we must thank our Editor and his staff for the care, skill, and constant application which they have devoted to this most exacting work.

8th February 1962

INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31ST MARCH 1961

1960								
£	*£*		£	*s.*	*d.*	£	*s.*	*d.*
		INCOME						
	2,667	On account of Grant receivable from the Nuffield Foundation	1,333	6	8			
		As advances against Royalties from Butterworth & Co. Ltd, Publishers	900	0	0	2,233	6	8
		EXPENDITURE						
50		Administration Expenses	50	0	0			
2,463		Salaries	2,392	19	0			
7		Field Work	3	4	0			
37		Travelling and Conference Expenses	51	19	0			
14		Editorial Expenses	12	9	6			
3		Audit and Accountancy	3	3	0			
2		(Sundry Expenses)	—	—	—			
	2,576					2,513	14	6
Surplus	*£91*	DEFICIT FOR YEAR carried down				£280	7	10
	675	Surplus at 31st March 1960 brought forward				766	0	1
	91	Deficit for year to 31st March 1961 brought down				280	7	10
	766					485	12	3
		Represented by:						
857		Cash at Bank and in Hand	533	3	3			
91		*Less:* Sundry Creditors	47	11	0			
	£766					£485	12	3

We have examined the above Income and Expenditure Account together with the books and records of Aslib relating thereto and certify that it is correct and in accordance therewith.

REYNOLDS, ADAMS & LAKE
Chartered Accountants

Warwick House, Warwick Court, Gray's Inn, London WC1
16th February 1962.

Letters to the Editor

HOW *DO* WE CLASSIFY?

Dear Madam,

May I be allowed to make a few observations on the rather curious though interesting paper on classification by Mr R. Moss, published in the February issue.

1. I am surprised that anybody writing a paper on classification should admit to a lack of knowledge of Colon, which is the only general scheme to embody modern classification principles. Presumably, therefore, Mr Moss is not *au fait* with facet analysis, the use of which would solve many of the problems which he raises.

2. A notation most certainly mechanizes schedules. An efficient notation certainly does not freeze them and to say that expansion is not possible, once the base of a classification has been completed, is sweeping and untrue; I fail to see why a more recent subject should *necessarily* have a shorter number.

3. Mr Moss says that a slight typing or filing error could confuse 669.822 (Uranium) with 669.882 (Potassium). A slight typing or filing error, or illegible handwriting, could also confuse Absorption with Adsorption, Carbon with Carbide, Indium with Iridium, etc., etc. It is surely unfair to blame a classification scheme for carelessness or incompetence on the part of the typist or filer.

4. 'Any library which still continues to treat pamphlets, trade catalogues, reprints, and correspondence by classification and cataloguing routines is wasting its time.' Would Mr Moss then ignore the subject content of such material?

5. Mr Moss seems to prefer alphabetical arrangement by subject heading. Has he never worked back from a specific subject to a more general one in answering inquiries, and would he not find this difficult in a purely alphabetical array? The arguments against alphabetical subject arrangement have been put by better writers than I, but I would merely give three groups of related subjects, with which I have had to deal in libraries, as an indication of the impracticability of such an arrangement.

a. Physics, Atomic Energy, Nuclear Reactors, Fusion Reactors.
b. Building Materials, Anhydrite, Gypsum, Lime, Plaster.
c. Personnel Management, Industrial Relations, Trade Unions, Collective Bargaining, Arbitration.

6. Mr Moss stresses the needs of the user but may one ask which user? He is indeed fortunate if all his readers expect to find the same book in the same

place. Surely it is better to classify by the intrinsic subject matter of the material.

7. I sympathize with Mr Moss regarding 'six two one point three seven nine six point two eight colon five four three stroke five four five colon five four one point one five', but we must remember:

a. Shelf classification, which can be broad, should not be confused with subject cataloguing for which UDC was originally intended;
b. Arguments against classification should not be based entirely on the known faults of UDC which is, after all, not a good example of modern classification thought.

Yours faithfully,
K. G. B. BAKEWELL,
Librarian, British Institute of Management.

Management House, London EC4.
5th March 1962.

Reply from Raymond Moss:

Dear Madam,

I reply to these points in the order they are raised.

1. 'I am surprised that anybody writing a paper on classification should admit to a lack of knowledge of Colon . . .'. Brother, where lack of knowledge goes, the difference between me and the rest is that I admit it.

I have encountered before the idea—may I say faintly insufferable—that anyone who does not worship at the shrine of the prevailing fashion is either too dim or too bone idle to read the sacred books. To these faults I plead guilty BUT one would have thought that when an author has said, and that not later than the end of his third paragraph, that he intends to discuss 'the simpler everyday routine practice of classification [which] has tended to be forgotten in the search for an ideal theoretical basis', he has then set his terms of reference pretty adequately and that talking about 'modern classification principles' is not going to be one of them.

I am afraid that my shortcomings have not prevented me tracking down certain references divorcing 'facet analysis' from its 'Colon' origins. I am afraid also that on this issue Mr Bakewell and many librarians and others display that same sort of unhappy confusion between principles and analysis which, in political circles for example, leads to civil war, strife, party splits, and bloody noses. Let us be warned therefore. May I also add that if Aslib will overcome some 'red-faced confidential' dilatoriness I shall be able to demolish the pretensions of these principles to any claim of modernity. Loyal pledges to the cloak-and-dagger brigade inhibit me from giving Mr Bakewell the benefits of my experiences with some of these attempts to 'embody modern classification principles'.

'Facet analysis' has a vogue because it embodies so well the modern principle that what cannot be understood must be profound. Its main use has been to provide a rich reservoir of jargon for examiners casting desperately around for questions. It has the added merit that it can always be relied upon to provide a reasonably respectable quota of failures, since clarity has never been its strong point. The famous exercise by Ogden and Richards showing sixteen meanings which academics had attached to the word 'meaning' would be a non-starter in any comparison with the numbers of meanings which librarians have attached to the word 'facet'. Most of the jargon has been provided by people who have had the wisdom not to suffer these examinations and most of the blame for its publication can be laid fairly and squarely at the door of the Belgrave squares with an occasional burnt offering thrown in from the wilds of Bloomsbury as well. As remarked somewhere recently, few publishers can resist the appeal of a captive audience.

I have seen several examples of 'faceted' schedules. Where the subjects of one or two of these were concerned, I had had the benefit of some previous instruction in those subjects. Therefore, I was not impressed by what I saw. I have no objection to people experimenting with any form of classification provided the main use is not to provide new forms of theoretical dogma for our modern inquisitors.

2. I gave a gentle hint about tying oneself to an analogy. All around us today there are examples of things mechanical, including office machinery. Nothing in notation bears any resemblance to this. So let us drop the mechanical analogy; it is an attempt to acquire a technical kudos where none exists.

As usual I am quoted out of context—this time on expansion. On the question of shorter numbers, Mr. Bakewell challenges and then hedges with '*necessarily*'. May I, as with Mr. Bird, draw his attention to page 40? But I see from his remarks in point 7 that he is not entirely incorrigible on this. If I may be allowed the last fling of the mechanical analogy, knights-in-armour would also fail to see why the horse should be superseded by the bike.

3. These typists and filing clerks—'carelessness or incompetence' again. Before rocketing them, I must ask Mr. Bakewell to examine the UDC 669 'expansion' and to compare sodium and potassium in index and schedules. There is room for a learned thesis here on how many libraries still manage to file sodium as potassium. But blame a classification scheme? Not while we have typists.

This, I think, is the schedule in which we have been told there are forecasts of 'facet' order. Not too long after its publication, I showed this schedule to one metallurgical Professor. He handed it back in ten seconds flat—'That's thirty years out-of-date.'

4. In most organizations, public or private, there are filing, correspondence, and registry offices which manage to file, store, lend, and get back just the variety of literature I named. These offices manage to do this and get their filing done by subject content in the capable hands of a few young ladies who have never had to be baffled by library science.

5. As I generally work forwards, I do not bother much about working back. Equally, artificial linguistic barriers about 'specific' and 'more general' do not deter me either. But—even in the most drearily orthodox of 'Dictionary' catalogues—what are the tracings for, if not to solve Mr. Bakewell's little local difficulty? Yes, I know nobody bothers to put them in. That is their look-out.

On the subject of alphabetical versus the alternatives, will all refer to the reference I quoted on page 41? Earlier on, I also referred generally to library text-books and gave an even more exalted authority to show quite plainly that 'words classify'. Can we have an end to this myth that only the subject catalogue classifies and the alphabetical and dictionary ones do not. If Mr. Bakewell regards alphabetical arrangement as impracticable he had better start reclassifying *Chemical Abstracts* and when he has finished with that he had better do the same for *Nuclear Science Abstracts* which somehow manages to deal with just the subjects he names in his example *a*.

On his group *c*, I used some time ago to find my way quite happily around four of the areas he has named. I say four because one of them would, I fear, have been deemed as belonging to the era of Parkinson and the law and unworthy of the attention of serious students of the dismal science. These days, the more polished practitioners of this then neglected trade acquire more wages in a week than we self-sacrificing librarians manage in a millenium. There is a moral here—never neglect anything because it does not have the approval of academics and examiners.

In those happy days, I used generally to manage without subject catalogues and—in comparison with other forms of literary detection—did not find them too informative when I did consult them. Had I then had also to put up with some of the notation I am expected to marvel at now, there would have been mayhem.

Of Mr Bakewell's group *b* I regret I know nothing, so he may have this one.

6. Which user? Why, this user of course. Let librarians wander into a library sometimes, and if the book is not where they expect to find it let them raise Cain. Some of the explanations offered will be interesting. 'Oh, yes, we agree one wouldn't think of looking there but, after all, that is where BNB put it.'

We must stop thinking, or at any rate talking, in terms of U words like 'intrinsic'. I dealt with this and the subject business last month. Blame the Aslib February/January publishing sequence if you now have to put up with me in every issue. (Why this sudden impulse by librarians to do everything in reverse? Has the recent reversal of some 'fundamental categories' had excessively far-reaching effects?)

7. So I seem to be getting my point over about notation. But really—how are classers ever going to get to the 'intrinsic subject matter of the material' when in every protest they make there is ample evidence that they do not read what is written? On point *b* here, the arguments are *not* 'based entirely on the known faults of UDC'. In my original, after giving the typical UDC number referred to I went on to say, 'This is . . . much less fearsome than some of the notations being advocated now.' This does not sound as if I am basing my arguments entirely on UDC even if, to spare some feeling, I do not identify the 'some'.

Yours sincerely,

RAYMOND MOSS

St. Helens, Lancs
12th March 1962

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Technical translation from French and Roumanian. 161 Rivermead Court, London SW6. Renown 1912.

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HARKINS, W. D. *Physical chemistry of surface films*. Replies to Librarian, Metal Containers Limited, Passfield Research Laboratories, Liphook, Hampshire.

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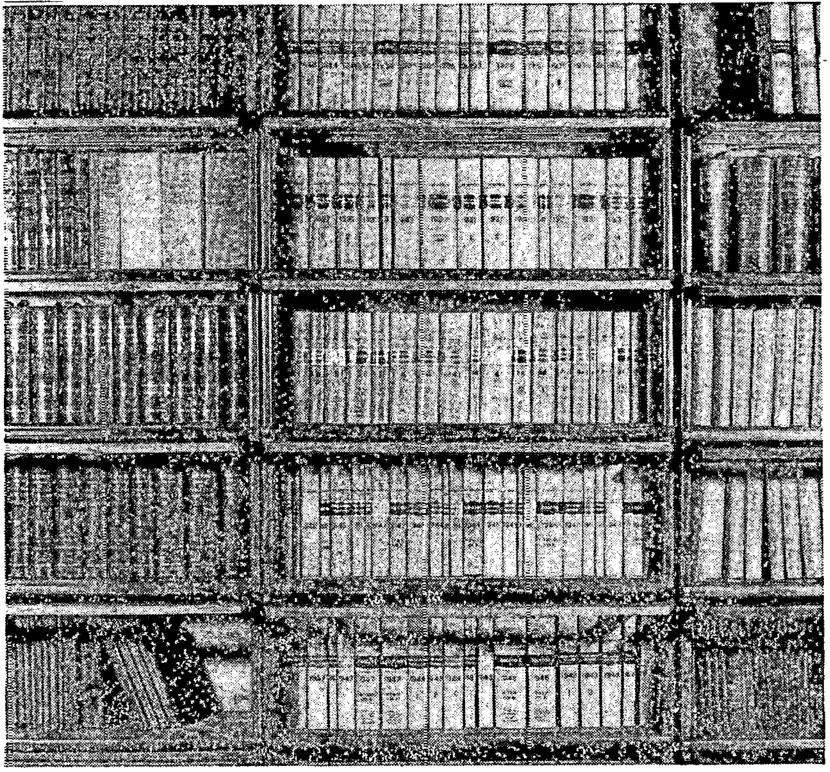

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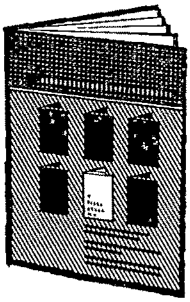

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Aslib Proceedings

incorporating Aslib Information

Research on Information and Library Matters

C. W. HANSON

Union List of Microfilms: last cumulation

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Aslib Proc. vol.14 no.5 pp.111-135 London, May 1962

DON'T STOP TO ASK

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 May 1962 Number 5

ASLIB CALENDAR

May

TUE.22. Advanced course on patents.
THUR.24. Engineering Group Annual General Meeting.
WED.30. Day visit to NLL, Boston Spa.

June

MON.4 – FRI.8. Senior introductory course to information work.
WED.6. Annual General Meeting in the Connaught Rooms.

July

FRI.6 – SAT.7. Northern Branch conference in Liverpool.

October

TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.

November

FRI.16. Northern Branch conference in Bradford.

Annual General Meeting

The Annual General Meeting will be held at 2.30 p.m. on Wednesday 6th June at the Connaught Rooms, Great Queen Street, London WC2. The meeting will be preceded by luncheon, 12.30 for 1 p.m., price 21*s.*

Common Market Conference

A conference on sources of information on the Common Market: what the information officer needs was held on 22nd March in London. The purpose of the conference was to give members an opportunity to discuss the implications for information officers of the expected British entry into the Common Market. An exhibition of published literature relevant to the Common Market was arranged by Aslib Economics Group concurrently with the conference. A report will be published in the June issue of *Aslib Proceedings*.

Northern Branch

The Annual General Meeting was held on 23rd March in Manchester. Forty delegates attended. The officers of the Branch remain unchanged for 1962–63: Chairman, Mr G. H. Davison; Vice-Chairman, Mr J. E. Bolton-Allen; Hon. Treasurer, Mr F. Newby; Hon. Secretary, Miss E. Boddy. The committee, including four newly elected members, is now: Mr A. R. Cameron, Miss I. M. Davidson, Miss J. M. Forsyth, Mr A. Johnson, Mr A. B. Jordan, Mr F. L. Pearson, Mr H. A. Roche, Mr L. Taylor, and Mr R. F. Watson.

Thirteen exhibitors took part in the exhibition of photocopying equipment which was held concurrently with the meeting and Mr H. R. Verry, O&M Division, HM Treasury, gave an interesting talk on photocopying which included descriptions of types of machine not included in the exhibition so that members were given a broad assessment of the equipment available and its uses.

Arrangements are being made for two Branch conferences. The first is to be held on 6th and 7th July in Liverpool and it is hoped to include visits to the Picton and Hornby libraries and to a steamship of the Pacific Steam Navigation Company. The second is a one-day conference provisionally arranged for 16th November in Bradford. Details of both these events will be circulated to Branch members as soon as possible.

Aeronautical Group

Ninety-five delegates attended the eleventh annual conference held at the College of Aeronautics from 13th to 15th April. Two sessions were held jointly with the Research, Special, and Information Section of the Library Association, which was holding its annual conference concurrently, making a total of some 160 librarians in the College.

The Annual General Meeting was held during the conference and the following officers and committee were elected: Chairman, Mr R. C. Wright; Hon. Treasurer, Mr J. S. Rosser, A. V. Roe & Co.; Hon. Secretary, Miss M. Dyke, Royal Aircraft Establishment, Bedford; members, Mr T. M. Aitchison, Mr E. A. Baker, Mr C. W. Cleverdon, Mr A. H. Holloway, Mr G. E. B. Percy, Miss E. H. Ridler, Mr F. H. Smith, Mr K. J. Spencer, and Mr R. A. Wall.

Engineering Group

The Annual General Meeting will be held at 2.30 p.m. on Thursday 24th May at Aslib. It will be preceded by luncheon at the Anglo-Belgian Club, 6 Belgrave Square, at 12.30 p.m.

Film Production Librarians Group

The Annual General Meeting was held on 4th April. The following officers and Committee have been elected for 1962–63. Chairman, Mr Jack Middleton, Associated British Picture Corporation; Hon. Treasurer, Mr H. Wynder, Pathé News; Hon. Secretary, Mrs Anne Hanford, BBC Film Library; members, Miss Peggy Dowling and Mr David Grenfell.

The preparation of *Film cataloguing rules* has now been completed and the typescript has been offered for publication by Aslib. A sub-committee under the chairmanship of Mr David Grenfell has started work on a manual of film library technique.

A limited number of copies of the Group's *Directory of film production libraries* is still available from the Hon. Treasurer, H. Wynder, 33 Sylvester Gardens, Hainault, Essex.

Fuel-powered Hobby-horses

The Fuel and Power Group held a 'Hobby-horse' evening on 20th March at which the Chairman, Mr F. Hickman, Mr H. C. Claxton and Mr J. J. Eyre demonstrated and described some of their favourite equipment.

Mr Hickman's hobby-horse in this case was a hand-operated embossing tool for making lettered or numbered adhesive, plastic-faced tabs for marking books, pamphlets, shelves, notice-boards, and other items.

Mr Claxton demonstrated library binding equipment for periodicals and papers manufactured by Jetleys of Huddersfield. This equipment was previously shown at Aslib two years ago.* Prices of materials suggested that this was an economic method of binding but allowance must also be made for labour costs. Substantial economies would be made when the suppliers changed from their linen backing strips to linen tags. Mr Claxton had used the equipment for forty-eight journal volumes of twelve issues each and the cost had worked out at 16*s* 8*d* per volume, using backing strips. With tags instead of strips the equivalent cost would be 9*s* 6*d* per volume. It was felt that this method had applications in smaller libraries but experience only would show how much heavy handling it would survive.

Mr Eyre discussed the merits of four different copying machines, all of which could be used in ordinary office lighting conditions.

1. *Xerox* (Rank Precision Industries). Besides being compact, this machine would enlarge or reduce for single copies or offset masters and was an entirely dry process. The question of wastage, which tended to be heavy with some types of machines, was practically eliminated by the use of an electrically sensitized plate which could be used 6,000 times. The equipment included a camera unit and developers for single copies (maximum 6), offset masters (paper or metal), and transparencies for use on dyeline machines. Cost of equipment complete, £1,250. Cost for up to six copies, 4*d* per copy.

2. *Ektalith* (Kodak). For those with less space and smaller financial resources the Ektalith offered a compromise. In this process the original was photographed on to paper which was wet-processed and used to make single copies

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**Aslib Proceedings*, vol.12, no.5, May 1960. p. 205

of the offset type. Copies were obtained by drawing the master and paper through rollers and then peeling apart as with normal office copiers. It should be noted that Kodak did not produce a camera unit for use with the Ektalith. Cost of the machine, £450.

3. *Dalcopier* (Copy-cat). For those not requiring masters for offset machines the Dalcopier would meet all copying requirements. This was a photographic wet process using one sort of paper only. A sheet of the paper was used to make a direct reversed negative of the original, from which any number of copies would be made on the same special paper. Developer and fixing fluid were housed in the machine itself and the rollers were electrically operated. Colours came out well, as did half-tone pictures and photographic negatives. Unlike many machines, exposure time was not critical. Cost of machine, £96. Cost of copies, 4*d* each.

4. *Verifax* (Kodak). Although expensive to purchase, this machine would produce up to twelve copies from one master at a total cost of 2*s*. The original was reproduced on to a gelatine-coated master which was developed in a tank of fluid, housed in the base of the machine. Copies were then pulled off through rollers, manually. Two things were emphasized with regard to the use of this copier: *i*, the operator must be quick in order to obtain twelve readable copies; *ii*, exposure time was critical and could lead to considerable wastage in the hands of a poor operator. Cost of machine, £170. Cost per copy from one master, 10*d* for first and 1*d* for each additional copy.

Chemical Group

The Annual General Meeting was held at Aslib on 4th April. Twenty-three members attended. The following officers were elected: Chairman, Mr E. F. Broome, Beecham Toiletry Division; Hon. Treasurer, Miss M. Hocking, Shell Chemical Company; Hon. Secretary, Mrs M. H. Meiklejohn, Distillers Company. Members of the Committee: Dr R. M. Klaar, Dr D. J. Campbell, Mr F. W. Masham, and Mr J. G. Hall. Mr Brendan S. Somerville of the American Chemical Society (ACS) gave an interesting talk on the future programme of ACS and the activities of the society's London office. Members are asked to send suggestions for future activities to the Hon. Secretary, Mrs M. H. Meiklejohn, Distillers Company Ltd, Great Burgh, Epsom, Surrey; telephone Burgh Heath 3470. New members will be welcomed. They should apply in the first instance to Mrs R. L. Sauvée, Liaison Officer, Aslib.

Miss L. G. Thomerson

We report with deep regret the death on 19th March of Miss Lilian Gertrude Thomerson, B.SC, Librarian of the Printing, Packaging, and Allied Trades Research Association (Patra) since 1936. Miss Thomerson was Patra's first and only librarian. Her first five years' work for the Association was almost completely destroyed by an incendiary raid in 1941, but she restarted the service, handling 500–600 loans a year, in temporary headquarters in a terrace house in Acton where the 'library' was accommodated in the tank cupboard and a boxroom. After the Association moved to Leatherhead in 1948 Miss

Thomerson was able to put her plans for expanding the library service into operation and not the least of her achievements has been the establishment of *Printing Abstracts* and *Packaging Abstracts* which now have a world-wide distribution.

Miss Thomerson was elected member of Aslib Council from 1945 to 1952 and also gave her services to the Conference and Meetings Committee (1949–50) and the Publications and Editorial Committee (1950–52).

FID Year Book 1962

The International Federation for Documentation (FID) has announced publication, in February, of the *FID Year Book 1962*. It contains up-to-date information on the composition of the Bureau, the General Assembly, and thirty-one Study Committees and includes a list of recent FID publications and the statutes of FID. It is available from the International Federation for Documentation, 7 Hofweg, The Hague, Netherlands.

FID 28th Conference

The 28th Conference of the International Federation for Documentation will be held from 24th to 29th September in The Hague.

French and German Technical Translation Courses

The Holborn College of Law, Languages, and Commerce will run an evening course in French technical translation on Mondays from 6.15 to 8.15 p.m., commencing 24th September. Tuition will be devoted to French/English and English/French translation and exercises will be based mainly on extracts selected from technical periodicals covering a wide range of subjects. Students, who will be prepared for the Diploma in Technical Translation of the Institute of Linguists, should have a good knowledge of French, at least equivalent to GCE A level. The fee for the course is 30*s*.

A similar course in German technical translation will be held. Further details are available from the Holborn College of Law, Languages, and Commerce, Red Lion Square, London WC1.

Automatic Translation Course

It is announced that a course in automatic translation will be held from 15th to 31st July on San Giorgio Island, Venice, under the sponsorship of Nato. Among the speakers will be Dr A. D. Booth of Birkbeck College and Dr A. F. Parker-Rhodes of the Language Research Unit, Cambridge.

Italian Group of Documentation Chemists

The formation has been announced by the Lombard Section of the Italian Chemical Society of a 'Group of Documentation Chemists'. The objects of the Group are: organization of periodic meetings of its members, promotion of contacts and exchange of ideas concerning documentation in chemistry, and organization of lectures and meetings on topics of particular interest to chemical documentalists. The establishment of the Group is an aftermath of the International Conference on Scientific and Technical Documentation and Information in Chemistry, held in November 1961 in Milan. The activities of the Group will be reported in the journal *Chimica e l'Industria*. Further details are obtainable from the Lombard Section, Italian Chemical Society, 10 Via de Politecnico, Milan, Italy.

Food Industries Advisory Service, Israel

It is reported that a Food Industries Advisory Service has been set up in Israel by the United States Operations Mission, Ministry of Commerce and Industry, and the Manufacturers Association of Israel, in order to help the local food industry with advice and information. The service includes classification of articles from about 120 journals from eight countries. Short abstracts are issued from time to time and reproduction and translation services are available. Further information is obtainable from the Food Industries Advisory Service, 22 Jerusalem Boulevard, Jaffa, Israel.

Fifth Annual Report of Council on Library Resources

Grants for work on basic library problems totalling nearly four million dollars during the past five years are reported in the fifth annual report of the Council on Library Resources, Washington. The Report lists 155 studies completed or in progress in the fields of cataloguing, indexing, union lists, durability of book paper, binding and repair of books, electronic communication, photocopying, library services and equipment, and international aspects. The Report is available from the Council on Library Resources, 1025 Connecticut Avenue NW, Washington 6, DC, USA.

Documentation Research in Physics

The first phase of the current Documentation Research Project of the American Institute of Physics is the development of an adequate reference retrieval system for research physicists, which will later be tested and the results compared with existing indexing systems and classifications schemes for physics research reports. In connection with the project an information file on the coverage of physics abstracting journals and the growth of physics literature is being maintained by the institute.

US National Agricultural Library

The library of the United States Department of Agriculture celebrated its centenary in March. To mark the occasion it has been renamed the National Agricultural Library. This library was taken over by the Agriculture Department in 1862 with a stock of one thousand volumes formerly housed in the US Patent Office. With the exception of the Library of Congress, the National Agricultural Library is now the largest US Government library in existence, with a stock of more than one million volumes.

RESEARCH ON INFORMATION AND LIBRARY MATTERS:

other than by Aslib

C. W. HANSON
Head of Research Department, Aslib

Notes on a talk given at Aslib Winter meeting, 21st February 1962

IN this talk I am using 'research' in the widest sense, to include methodical fact-finding investigations and experiments and I am interpreting 'information and library matters' also in the widest sense, to include matters which affect our work very much—such as publishing procedure, techniques of writing—but over which those engaged in our field of research can seldom have much control. I am excluding, however, research mainly concerned with public library matters and non-specialized information.

Much research is carried out within single organizations for their own purposes, results being applied internally. Results may not be applicable elsewhere or in other circumstances; but in so far as these projects seem to be illuminating for us, or the results applicable by us, I will mention them.

Except in the USA there are few consolidated lists of current researches. For this talk I have not made a methodical survey of the literature, and may well have missed references to some projects, particularly those in progress abroad. There are far too many to mention them all individually.

Probably the greatest volume of research is at present being done in the USA and USSR; with some in the UK, Netherlands, Germany, France, etc. In France the CNRS has just offered a prize of 10,000 NF for plans for an information system and centre. The scale of operations in the USA is illustrated by the fact that the National Science Foundation alone gives grants under the heading of Documentation Research of about 1 million dollars a year (plus about another $3\frac{1}{2}$ million dollars for other help to scientific documentation). The latest issue of *Current Research and Development in Scientific Documentation* lists 166 projects on:

needs and uses	39
retrieval	69
machine translation	38
equipment	20
	166 plus 116 related projects

The latest issue of *Library Research in Progress* (USA) lists 77 projects.

In the USSR, Mikhailov recently stated that at the All-Union Institute of Scientific Information he had a research staff of 450 and hoped to have 900 this year.

Information from other countries is far less complete, but I am sure the volume is nothing approaching this. In the UK we have Aslib groups here and at Cranfield, several mechanical translation groups, the Classification Research Group, and some others to be mentioned later, plus researches by organizations for their own purposes.

It is instructive to notice two very similar researches, one American and one English, recently published. Both covered charging (loans records) systems. The English one (Manchester College of Science and Technology) got a grant of £150 from the Library Association, the rest of the cost being carried by the College and the investigators, who did the work during their vacations. The USA project had a grant of $83,000 (nearly £30,000), the work being done by a firm of management consultants.

Abundant staff and money do not guarantee useful research and good work can be done with small resources, but lack of money may make it impossible to tackle some jobs at all and make progress on others impossibly slow.

Very broadly, I should say that most of the large-scale and expensive research effort is going into:

application of machines to storage and retrieval, to translation, and indexing;
intellectual problems—classification, coding, semantics, linguistics and so on —involved in making information amenable to machine handling;
and, to a much lesser extent, studies of the needs and working habits of specialists, notably scientists.

For the purpose of this talk I have divided the whole field which interests us into the following:

1. The originator—normally the writer.
2. The primary publisher and original distributor.
3. The secondary publisher—of abstracts, data books, etc.
4. The library network and individual libraries, their services and operations —here I include information retrieval and mechanical translation.
5. Oral and visual communication.
6. The user and potential user of information, his needs and habits.

I will consider each of these in turn, indicating broadly what is going on, mention some specific projects by way of illustration, and try to assess their significance to us. To keep things in balance, I shall draw attention also to lack of research in some areas.

1. *The originator*

The way a man communicates his knowledge, thoughts, and discoveries matters to all of us: the level of his writing, its simplicity or complexity, its manner of presentation generally and whether indeed he does at least try, or is allowed, to communicate at all.

Here we know very little. I know of little substantial research designed to throw light, for instance, on the amount of potentially useful information which is withheld on national or commercial security grounds; on the incentives or deterrents to writing and publication; or on methods of matching writing and presentation to the needs and reading abilities of users.

There is a small US investigation of the reasons for delays in converting a research report into a paper for publication, but little else, although of course the results of investigations in other areas may ultimately prove illuminating for us; work on information theory, for instance, and on school textbooks.

2. *Primary publishing*

On the whole publishers in the West publish what, how, and when they like. There appears to be little co-ordination or consultation, and no deliberate attempt to match publication either with the output of useful information or with readers' needs. I know of no major investigations by publishers, as a group, on these broad matters; but many individual publishers have taken some action on particular aspects. Perhaps the most revolutionary is the production of a periodical, *Wildlife Disease,* wholly and solely in the form of microcards. Each 5 in. × 3 in. card contains a single article, with the reference in full-size type. A microcard reader is supplied very cheaply—$10. This is a three-year experiment.

Most of the other experiments by publishers relate not to the basic contents of their publications, but to means of making the contents more useful to readers. To help its readers the American Institute of Chemical Engineers has worked out a 7,000-word thesaurus of technical terms. Each article in its publications carries a list of the keywords covering the subject of the article, and the publishers will soon supply abstract, keywords, and reference in 5 in. × 3 in. format, with the journal, ready for incorporation into the subscriber's system.

Cataloguing-in-source—that is, the supply by publishers of catalogue cards with their publications—has been much discussed and investigated. It seems a good idea, but nevertheless a recent investigation led the Americans to think it impracticable.

The American Institute of Physics, which has its own documentation research unit, is studying indexes in physics journals and the possibility of getting authors to select significant words and phrases for indexing, and is preparing a classified glossary of subject headings.

There are a number of other investigations and experiments of broadly this kind in progress. We should benefit from them in so far as they enable us to search certain journals and groups of journals more quickly and easily; but they leave untouched the broader questions of the form and co-ordination of primary publication—the question, for instance, of issuing individual papers rather than periodicals.

Some useful work has been done in USA on paper quality for long life, and many trials and experiments with printing methods other than letterpress are being made. Some work has been done on the stocks of back issues of learned society journals needed to meet future demands.

3. *Secondary publishing*

By this I mean abstract journals, data books, handbooks, reviews of progress, etc. The coverage of abstract journals and services, duplications and gaps are of concern to all of us, and are the subject of some investigations.

The British Commonwealth Scientific Office (BCSO) is currently exploring this field. The International Federation for Documentation (FID) is starting a world-wide survey and several investigations in narrower areas are in progress.

With one exception, however, most of the substantial work on abstract journals concerns methods of indexing them. The one exception is the attempt to develop automatic preparation of the abstracts themselves. Luhn of IBM is one of the pioneers in this work. The principle is to feed to a computer a text which has been converted to a machine-readable form. The computer is programmed to identify, by frequency counts, the most significant words and the phrases containing them in conjunction. The author's original sentences which contain these phrases are then printed out to form an abstract.

The first results impress me, but there are obvious difficulties: e.g. the production of machine-readable text (or of character-reading machines), the labour of programming, and the author who employs 'elegant variations' rather than a limited vocabulary.

Several large publishers of abstracts and title lists have undertaken research on the mechanization of compilation and indexing—*Chemical Abstracts* and *Index Medicus* (formerly *Current List of Medical Literature*) to mention two.

For most of us the most interesting results of these are the quicker publication which they promise. For the few who are directly concerned with the production of large printed indexes, they have a more direct value. Research in mechanization in allied fields has yielded title indexes such as *Chemical Titles* and the prospect of new forms of index such as molecular formula indexes and citation indexes.

Eugene Garfield (Institute for Scientific Information, USA) is working on a three-year project on citation indexes. The idea is that if an author cites a paper A, that paper is relevant to his own paper B, even though the subjects of the two papers seem to be different. The normal subject index might not bring together entries referring to the two papers so that the man concerned with the subject of paper A would not know of paper B, and vice versa. The citation index is intended to fill this gap, and provide an additional approach to literature searching.

In general I think it is true to say that most of the publishers of very large abstract journals are conscious of the need to mechanize their operations as far as they can and are favourably disposed to undertake research to this end.

The need for and compilation of data books appears not to be the subject of so much investigation. One experiment of this type is, however, worth mention: a group associated with the Royal Aircraft Establishment at Farnborough is employing a Mercury computer to collate and assess information about properties of materials, to yield printed data sheets. Properties will be expressed in both metric and English engineering units, and it will be possible from the sheets to pick materials with high or low values for certain properties or combinations of properties. The scheme covers at present:

56 properties, 199 material characteristics (e.g. machinability) and
30 merit indices (e.g. density × specific heat).

This service, if it comes to fruition, should be useful to all of us.

In Germany the Gmelin Institute is investigating the use of both computers and other mechanized systems to help them in compiling and exploiting data on inorganic chemistry.

4. *Libraries and library operations*

I will divide this field into four:

a. The structure of the library network, library co-operation and library resources
b. Improving conventional library routine
c. Information storage and retrieval, particularly mechanical systems—and associated matters
d. Foreign language translation, particularly mechanized

a. A number of studies and investigations in this country, often undertaken piecemeal to serve limited purposes, are nevertheless significant for us because they may affect the service and resources of libraries, and the pattern of library use.

Investigations of the demand for periodicals from the special libraries made by the National Lending Library (NLL) fall into this category. So will the investigation NLL proposes to make of non-use and the reasons for non-use. Research undertaken by the Patent Office Library to guide them in their plans for the new Reference Library may be very important to us as users.

In a broader field, the Roberts Report on the public library system and Sewell's working party on its implementation, may have results which affect us, as may the Library Association's investigation into co-operative acquisition of foreign books.

b. There is probably much more going on here than has been published and than I know of. Many large organizations carry out investigations and make experiments for their own purposes, but do not necessarily publish. In the USA, where so much work is done under contract, more is published or at least available.

For instance, the March, 1961, issue of *Library Research in Progress* listed seventy-four projects. Subjects covered included:

Fire protection
Library building
Photocopying
Paper-bound books
Card life
Binding
Facsimile transmission
Closed-circuit television
Methods of searching

From these and other projects I know of here and elsewhere, let me select a few.

Card life. If mechanized sorting is to be used, a long card life is needed—longer than, say, in accountancy or market research, where data is soon out of date. Several organizations here and in the USA are investigating card life.

Closed circuit television and facsimile transmission: to enable pages of a document in one library to be displayed or reproduced elsewhere. Virginia University has done much work. A TV system has been developed to link the library of the Manchester College of Science and Technology with the Chemical Engineering Department half a mile away. A large industrial firm in England has made preliminary investigation of the potentialities of facsimile transmission and have produced some results. The Xerox Corporation in the USA have produced a potentially useful machine to give a readable image and a paper copy.

c. It is on information storage and retrieval (and on mechanical translation) that the big money is being spent. Major investigations on information retrieval are in progress in the USA, USSR, UK, France, Israel, Germany, Hungary, Japan, India, Netherlands, etc.

Most of the projects are long-term. Most of them relate to partly or fully mechanized systems. They include research on the machines themselves, on converting the language of documents into the language of machines, and vice versa, and on a multitude of problems associated with meaning and language. Mathematicians, scientists, logicians, and language experts are engaged in this work, as well as librarians.

Few of these researches have yet yielded systems which are in full operation as day-to-day tools. From among the hundred or so major projects about which we have some information, let me mention a few at various stages of development.

Western Reserve University/ASM computerized system. Experimental, but being used to provide current awareness and question-answering services. Testing, in conjunction with Cranfield, of retrieval efficiency is in progress.

US Patent Office—searching one section of files.

In UK, Leslie of the National Engineering Laboratory has used computorized information retrieval for his own purposes. Claridge has been working on mechanized information retrieval for chemical composition of plants. It is worth noting that in a recent report on his work it was said 'There is no intention at present to set up a register of plant composition based on this groundwork because there appears to be no one organization which can at present justify the expense entailed in carrying out the scheme in its entirety'.

It is too early yet to speak with confidence about costs of advanced mechanized systems—or indeed of many other aspects. It is, perhaps, safe to say that mechanized systems show great promise where deep searches of a large volume of information are needed frequently: e.g. in patent searching; that the input stage now presents greater difficulties than the storage and retrieval stages and needs much further study; that initial costs, and costs of input in readiness for retrieval, are only likely to be justified in subject areas where demand for searches in depth is heavy and frequent; and that storage and retrieval is only one part of the total information flow problem—even total success in this field would still leave us with many other problems.

One practical point is worth mention. The larger and more efficient the system, the more relevant references it is likely to produce in answer to a question, however narrowly defined. The ASM and ASTIA systems, I understand, commonly yield a hundred or more answers to even a narrow question. This is a virtue not a defect; but it means that the output will still need to be screened and assessed by an information scientist or librarian if the research worker is not to be overwhelmed.

I have been speaking of sophisticated computer systems. There is of course much study of other information and retrieval systems fully or partially mechanized or purely manual. At the other end of the scale are simple manually operated punched-card systems, edge-notched and aspect. There is plenty of practical experience to report but not much research.

All of these systems, whether mechanized or not, involve problems of classification or coding and decisions on such matters as whether to use the actual words employed by the writer or to translate his work into the language used by the system; whether to aim at an output comprising numbers, which then have to be translated into actual documents, or at cards bearing abstracts, or microfilms of originals, and so on.

Interesting work is being done at the Scientific Documentation Centre in Scotland by Dr P. S. Davison who is investigating, among other things, the operation of a national index of spectra, based upon a photo-electric curve-matching device.

In the field of classification there is great activity. Some of the work is closely connected with mechanization problems, much is more generally applicable. The Classification Research Group in the UK has set the pace, and many of the most fruitful workers are English: Vickery, Kyle, Foskett, Farradane, Fairthorne—to mention a few.

d. Since there is reason to suppose that an increasing proportion of scientific literature will be published in languages we do not know, it is natural that much research should be devoted to lowering foreign-language barriers.

Some recent research in the USA and elsewhere has provided figures for percentages of scientists who say they can read various foreign languages, but not much about how much they *do* read.

Aslib has been doing some work on language teaching and on cover-to-cover translation and translating pools: Herner and Virginia University on cover-to-cover translations; and the American Bible Society on the 'science of translation'.

Most of the research is on mechanical translation. Major work is in progress in at least twenty-five groups in twelve countries. Most of it is on Russian to native language translation. In addition there are at least seventy-five projects on aspects of linguistics, character recognition, etc., which have some bearing on the subject.

In the UK the main groups include the National Physical Laboratory, Booth (Birkbeck College), and Masterman (Cambridge Language Research Unit).

Very broadly, mechanical translation researches fall into two main groups: those which aim at virtually perfect translations, and those which aim at rough-and-ready but usable translations. Many are concentrated on the translation of one language into the native language; some at general interlingual mechanical translation (Masterman). In some projects an intermediate artificial language is used.

All this work involves deep analysis of both input and target languages and vocabularies, and the conversion of the input text into a form in which it can be handled by machine. This might be (but is not) done at the stage where the original text is printed, or by human operators (who may need some knowledge of the language) or by reading machines.

Impressive demonstrations have been given of translations of short texts in narrow subjects after all the preliminary work has been done; but no work has advanced far enough to yield a comprehensive, still less a commercially viable, service.

The rewards of success in this field are obvious and very great. They justify much effort and money. I doubt if services of practical value to us will be available before 1970. But I think by 1980 they will be.

5. *Oral and visual communication*

We all know that much communication of specialized knowledge takes place by talking and listening, rather than by writing and reading. Halbert and Ackoff have shown how important it is to chemists. Oral communication can be formal—at meetings, conferences, etc.—or informal.

Since a worker's time is limited, we badly need to know how effective oral communication is compared with written, how to maximize the value of both formal and informal occasions. A few tentative investigations have been made. How much is lost and how much gained by relying upon a person, rather than a survey of the literature? We do not know—nor do we know the effectiveness, compared with written matter, of pictures, films, television. For some forms of information a film strip might be much better than a booklet.

6. *Needs and habits of users*

Current use habits are related to present systems. The availability of new facilities may change habits. Stanford Research Institute are studying the interaction of user and system. Preliminary results suggest more research is needed on a worker's own personal 'microdocumentation'.

Many investigations are in progress, mostly for individual institutions, of scientists' use of information, mainly derived from studies of use of libraries: e.g. UKAEA on library uses; University of Chicago study of frequency of use of books, to predict future use; American Psychological Association on the generation of needs for information. Many use studies have been reported in Aslib publications, and some analysis of subject inquiries is in progress.

The results of these studies, taken together, are beginning to yield the faint outlines of general patterns. More fundamentally, the Case Institute is studying methods of measuring the value of scientific information.

From all this we are getting a fair amount of information about the documents people use and, in a vague way, what kind of people ask for what kind of documents. But we still know very little about what kind of information they need from the documents, and what kind of system is needed to provide it. Moreover, some organizations make virtually no use of the available facilities, but we do not know what to do about it. The European Productivity Agency (now incorporated in OECD) are doing valuable work on this problem.

UNION LIST OF MICROFILMS: LAST CUMULATION

Report received from the Union Library Catalogue, University of Pennsylvania, Philadelphia

The *Union list of microfilms: cumulation* 1949–1959 is now available from J. W. Edwards Inc, Ann Arbor, Michigan.* This is the last Cumulation which the Philadelphia Bibliographical Center and Union Library Catalogue will publish. With the completion of this Cumulation the Center has carried the burden for total microfilm listings for exactly twenty years without financial support of any kind. Three major developments: the tremendous flood of microfilm accessions among American libraries, the increasing desire to divide materials by types, and the demand to expand the list to include all kinds of photo-reproduction (i.e. microprint, microcard, etc.) have forced the Center to cease publication with Cumulation 1949–1959. Because of worldwide use of this Union List, an account of its rise, development, and demise may be of interest to librarians and scholars.

The *Union list of microfilms* was initiated in the Spring of 1941 by the Philadelphia Bibliographical Center and Union Library Catalogue and its Committee on Microphotography. The American Library Association Committee on Photographic Reproduction of Library Materials, and the Committee on Scientific Aids to Learning had considered the desirability of such a list and, in September 1941, Herbert A. Keller, in his *Memoranda on Library Cooperation*, no. 1, wrote of having a center which 'would encourage a union catalog of film holdings.' After ascertaining that neither the Library of Congress nor the Committee of the American Library Association was contemplating the compilation of such a list, the Philadelphia Committee decided to undertake the task.

In June 1941, the Committee sent requests to almost two hundred of the major libraries and filming services of the country asking them to contribute lists of their microfilm holdings. Institutions numbering 111 furnished records of their microfilms and in 1942 the first mimeographed *Union list of microfilms* containing 5,221 individual titles of books, serials, and manuscripts appeared. The co-operative reporting of holdings continued, the number of contributing libraries increased, and Supplements 1 to 5, 1943–1947 were issued listing 13,180 accessions received from 1942 to 1946 inclusive.

The Philadelphia Bibliographical Center and Union Library Catalogue continued to receive additional accessions and to maintain a union catalogue of microfilms. Having accomplished its mission, the Committee on Microphotography relinquished its functions directly to the staff of the Center in 1948. Because the accumulation of new materials reached such proportions and the demands for the earlier lists, long out of print, continued to increase, the Center decided to issue a revised and enlarged edition as soon as practicable. Before beginning the actual editing, the Center sent a questionnaire to 290 college, university, and research libraries, public libraries, state libraries, historical societies, federal agencies, and industrial firms for their comments concerning the use to which the list had been put, the arrangement and content, and the preferred listing to be followed in the revised edition. The majority of these institutions preferred the single alphabetical arrangement with the addition of the Library of Congress subject classification symbol prefixed to each entry.

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* Price $35. (£12 11*s* approx.)

In 1951 the *Union list of microfilms: revised, enlarged, and cumulated edition* was published by J. W. Edwards. It included all titles listed in the *Union list of microfilms*, 1942, and in the Supplements 1–5, 1943–1947 with the addition of some 6,500 accessions received from the 197 co-operating institutions from January 1947 to June 1949, a total of 25,000 entries. This Cumulation is available as a reprint from University Microfilms, Ann Arbor, Michigan.

Duplication of effort in the listing of microfilmed materials started in 1948 when the Association of Research Libraries published *Newspapers on microfilm*. This list included all newspapers on microfilm reported to the National Union Catalog by libraries and other producers of microfilm as well as many serial titles previously reported in the *Union list of microfilms*. This led to the establishment of a microfilm clearing house at the National Union Catalog. In July 1952 the Philadelphia Bibliographical Center and the Microfilm Clearing House of the Library of Congress agreed on a clarification of their respective responsibilities in publishing lists of microfilms. The administrative officers of the Library of Congress concluded that it should not be a function of the Microfilm Clearing House to publish lists of microfilmed serials other than newspapers.

In July 1953 Edwards published the *Union list of microfilms: supplement* 1949–1952 which included 14,080 entries representing accessions reported by 215 co-operating libraries from 1st July 1949 to 31st July 1952.

In 1952 *Dissertation Abstracts* (formerly *Microfilm Abstracts*) expanded into fuller coverage of American theses on microfilm. Therefore the *Union list of microfilms* omitted from its first Supplement 1949–1952 all theses included in *Dissertation Abstracts*, volume XII, 1952, and all American theses were subsequently dropped from *Union list of microfilms*.

In 1957 Edwards published the *Union list of microfilms: supplement* 1952–1955, which included 20,000 entries representing accessions reported by 130 co-operating libraries from 1st August 1952 to 31st July 1955.

In 1957 a second pressure to divide lists of microfilms by types of materials developed when the Council on Library Resources made a grant to the Committee on Documentary Reproduction of the American Historical Association to prepare a *Guide to photocopied historical materials in the United States and Canada*. This list, published in 1961 by the Cornell University Press, included, by fields of history, 'bodies' of photocopied historical manuscripts and archival material. It drew considerably upon the materials published in the *Union list of microfilms*. Although the term 'bodies' of photocopied historical materials would indicate the exclusion of historical manuscript materials from the *Union list of microfilms*, the Philadelphia Bibliographical Center did not exclude such material because of the difficulty of extracting entries from its lists. The Center, furthermore, is convinced that the primary purpose of its *Union list of microfilms* is the location of a microfilm in one or more libraries in the United States and Canada. The arrangement in a single alphabet of all books, monographs, manuscripts, and journals on microfilm seemed the only logical method for a convenient location tool.

Shortly after the 1959 announcement of the Philadelphia Bibliographical Center that it would cease publication of the *Union list of microfilms* with the present Cumulation 1949–1959, the Council on Library Resources made a grant to the Association of Research Libraries to make a study of the bibliographical control of microforms. The study was carried on under the direction of Wesley Simonton. His report: *Bibliographical control of microforms* was submitted to the Association of Research Libraries on 1st June 1961 and subsequently published in *Library Resources and Technical Services*, volume 1, number 6, Winter 1962, p. 29–40. This thorough study makes specific recommendations concerning the establishment of a new bibliographical record devoted to the listings of master negatives. In July 1961 the Association of Research Libraries endorsed in principle the recommendations contained in the report and appointed an advisory committee to take the steps necessary to carry them out. Until such time as definite decisions are made concerning this report, the Philadelphia Bibliographical Center will continue to receive and hold additional microfilm accessions from contributing libraries. It will not undertake to edit or publish these accessions as before.

Letters to the Editor

PUNCHED CARDS

Dear Madam,

After having read Mr Negus's highly entertaining and informative paper on the juggling of edge-punched cards,* I cannot help wondering if, in changing to multiple-entry subject card index, he still has not backed the right horse. Could not the ASM Metallurgical classification be put straight on to Peek-a-boo cards and used as a co-ordinate index? This would be a less sophisticated form of ASTIA's automated retrieval system where document numbers are put on to magnetic tape instead of being punched on cards. Bill Barden, in conversation at the Aslib Aeronautics Group Conference in July [1961], expressed the view that a Peek-a-boo co-ordinate index was extremely efficient for document collections of 100,000 or less, and that computer scanning was only a logical extension of a highly selective retrieval technique.

Whilst there are others better qualified to comment on the merits and demerits of a co-ordinate index, I would offer a few suggestions which our own studies of information retrieval techniques have brought to light. In particular I would refer to A. Johnson's paper† which, after a stimulating visit to see the index described in action, was my own starting point. The paper 'The Technologist and his Information Facilities' by R. Snel also gives some very cogent arguments for the adoption of this type of index. The latter paper was given to a joint Aslib/Institute of Petroleum Meeting on 15th November 1961 and is published in the *Institute of Petroleum Journal,* April 1962.

With a co-ordinate index on punched Peek-a-boo cards, retrieval is instantaneous or nearly so; a visual comparison of relevant concept cards gives the numbers of the documents, these are then either retrieved directly, or their abstract/reference scanned from a cumulative serial register; kept in a loose-leaf binder, this register is very convenient to read and easily updated. It may also be kept in card form although cards can get lost and they are easily misfiled.

Looking ahead, if BISRA's annual production of reports averages 250, then by using Peek-a-boo type cards with a capacity for 10,000 documents, it should be possible to accommodate forty years' growth on, say, 5,000 such cards, assuming that this number of descriptors are used. In contrast, using their existing method in forty years the collection would amount to some 24,000 index cards.

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* Negus, C. Practical experience with the ASM metallurgical literature classification. *Aslib Proc.,* vol. 13, no. 10, October 1961. p. 274–89.

† Johnson, A. Experiences in the use of unit concept co-ordinate indexing applied to technical reports. *J.Doc.* 1959, p. 146–55.

An additional benefit in using a co-ordinate index would be that repetitive typing time is reduced by two-thirds approximately, quite apart from any space-saving in cards. Against this one has, however, to offset the longer period spent on the more detailed classification that is put into a co-ordinate index, but the benefits of detailed indexing are self-evident.

In conclusion let me say that, whilst offering what I hope is constructive criticism, I have carefully omitted to mention that we ourselves have only a pilot scheme in operation. Even at this early stage, however, I am completely convinced of the superiority of co-ordinate indexing over the more conventional methods.

Yours faithfully,
Monsanto Chemicals Limited,
P. D. J. RAE,
Librarian

Fulmer, Slough.
23rd January 1962

HOW DO WE CLASSIFY

Dear Madam,

It is well known that no other subject can so quickly bring confusion to a meeting of librarians as can 'Classification', and the correspondence resulting from the paper by Mr Moss (*Aslib Proceedings,* January 1962) appears to be following the usual trend. If I step in to add possible further confusion, it is only because of the oblique allusion to the Cranfield Project made by Mr Moss in his letter.

To take some relatively minor points first, it would appear logical to suggest that the shorter the notation the better. The same subject can be denoted by 'WINGS, SWEPT—Longitudinal stability. Wind tunnel tests' (with its fifty-seven characters or spaces) or by '533.693.1: 533.6.013.412: 533.6.071' (having thirty-three characters). However, if 'A' is substituted for '533.6', the characters are reduced to eighteen. In the aeronautical facet schedules, the notation would only have fifteen characters or spaces, i.e. Cd(Iidb) Ocb Vn, but my own order of preference would be in inverse order of length, namely alphabetical, UDC and facet.

However, while Mr Moss is entirely right in saying that notation must be controlled for the benefit of the user, Mr Boyd is making a common error in implying that 'Uniterm, Peek-a-boo, and the well established Hollerith and Powers-Samas systems' are comparable. Uniterm is a descriptor language as is the UDC, a list of alphabetical subject headings or a set of facet schedules. Peek-a-boo and (in this context) Hollerith and Powers-Samas are storage and retrieval devices in the same way as is a card catalogue or a printed index. I could, but would not be likely to, use Uniterm with a card catalogue; more satisfactorily I could use UDC with Peek-a-boo, Hollerith, or Powers-Samas equipment. It may be noted that when the Atomic Energy Research Establishment at Harwell gave up the use of machine equipment as the storage and retrieval device for a collection classified by UDC, it was not UDC that proved unsuitable but the storage device. (The paper by Ashthorpe in *Aslib Proceedings*, 1952, pages 101–4 might usefully be read by those playing at being up to date in installing mechanized information retrieval.)

More basically, the Cranfield work has shown that much of the argument about classification, co-ordinate indexing, subject headings, etc., is redundant. Indexing is a two-stage process. First, one has to decide what the document is about and what are the concepts that merit inclusion for the purposes for which the index has been compiled. This is at present an intellectual process. The second stage is to translate the concept into the chosen descriptor languages and is, or should be, a purely clerical process. If the same concepts are used, the information content of resulting indexes must be exactly the same irrespective of which descriptor language is used. Depending on operating circumstances, storage and retrieval devices will vary in their effective use, and this in the main should determine the type of descriptor language. My own organization I believe to be best served by a card catalogue; there are marginal advantages for the arrangement of the cards in the catalogue to be by alphabetical subject headings; to assist users to select the most useful headings, we are compiling a number of different classification schemes, each slanted to a different subject interest, as being somewhat more effective than the conventional 'See also' references.

The exclamation mark at the end of Mr Moss's sentence where he tells what 'Aslib's Cranfield brethren are supposed to be doing' seems to imply a certain scepticism on his part as to whether it is being done. His scepticism is quite justified; we believe that a great deal which has long been the subject of fruitless theoretical argument can now be discussed with some reasonable basis of facts. We also hope that we have identified the problems to be investigated regarding effort-in-input against information-in-output. The most that the present investigation can be said to have done in this aspect is to show (for those who wish to see) the probable trend, but it was far too crude to permit the refined measurements necessary to convince the disbelievers. A completely new programme of investigation has now been prepared and will, I hope, take us a stage nearer the answer.

It is probably rash to attempt to discuss such matters in a brief letter and I will not attempt to nail the fallacy of Mr Boyd that Uniterm allows a multi-dimensional approach while a classified catalogue can only have a one-dimensional approach. The publication of the final report on the present Cranfield work should answer many points which this letter will probably raise in the minds of its readers.

Yours faithfully,
C. W. CLEVERDON,
Librarian

College of Aeronautics Library,
Cranfield, Bletchley, Bucks.
22nd March 1962

Madam,

In spite of what Mr Moss and Mr Boyd say* I have from my own personal experience convincing evidence, which I can produce if required, that classification is an efficient method of information retrieval, which will not be replaced in the foreseeable future by anything except better schemes and better classifiers. With this view those best qualified to express an opinion would, I am sure, agree.

I will not pursue this argument further as your space is limited as I should like some enlightenment on 'feature schemes', which Mr Boyd is confident will replace classification.

Mr Boyd does not make it clear whether he is talking about a library or an information bureau where all the information is on cards, operated by some kind of punched-card system. If he means the latter, I have had no experience in this field and cannot say how much weight his argument carries. He is, however, not entitled to say that any system based on alphabetical subject indexing is delightfully simple. What about synonyms, generic terms, specific terms, terms in the form of a phrase, to mention a few complexities? He may not know that there is a Society of Indexers, which finds it worth while to hold meetings and publish a journal. I cannot follow his argument about 'dimensions' and in any case I cannot see how feature systems satisfactorily get round the defect in classification schemes by which when some subjects are related together others are scattered.

There is at least one reason why Uniterms and similar projects are not satisfactory for a library. If an alphabetical index is the sole guide and books and documents are not classified, the material on a given subject will have to be collected up from as many places as there are books and documents. In a library there may have to be several parallel runs of material necessitated by differences in physical form, but even then the time taken to assemble material will be immeasurably shorter than in places where the material is not physically classified.

But in any form of information retrieval I would be wary of anything that looks so simple on the surface that it seems to dispose of all difficulties hitherto encountered. I understand that the promoters of mechanized retrieval systems are now returning to something like classification having discovered that they cannot disregard logical categories and relationships.

Yours faithfully,

O. W. PENDLETON,
Librarian

The Chartered Insurance Institute,
London EC2.
26th March 1962

**Aslib Proceedings*, vol.14, no.3, March 1962, p.67–9.

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ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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MEMBERS' ADVERTISEMENTS

The charge for advertisements in these columns is 4*d* per word, minimum 5*s*. An additional charge of 6*d* is made for the use of a box number.

TECHNICAL and scientific translations from Russian, German, and Polish by specialist. B. Klipstein, B SC(HONS), 79 Shipley Fields Road, Shipley, Yorkshire. Tel. Shipley 58215.

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WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Technical translation from French and Roumanian. 161 Rivermead Court, London SW6. Renown 1912.

TRANSLATIONS, technical, scientific, including medicine and biology, from/into Russian, German, French, Polish, and from Ukrainian, Belorussian, Czech, Slovak, Slovene, Serbo-Croat, Macedonian, Bulgarian; also scanning and abstracting. F. Lachman, DIPL.ING.CHEM, 10 Staverton Road, London NW2. Willesden 4049.

Appointments vacant

AMERICAN university science librarian desires 1–2 years experience in science library of Great Britain or UK. Library qualifications, graduate degree and training in botany plus college teaching and university library experience. Family. Exchange of positions

with British librarian possible. References (referees) available. Special interests: conservation, plant taxonomy, history of science, history of printing, Quaker history, bibliography of geology-geography, map librarianship. Edward P. Thatcher, Science and Map Librarian, Science Division, Library, University of Oregon, Eugene, Oregon, USA.

AN INFORMATION OFFICER is wanted by AEI for the Technical Services Department at Rugby. Applicants should be experienced in obtaining and disseminating engineering and technical data. Knowledge of German will be an advantage. Apply giving details of age, experience, and present salary to the Manager, Technical Services Department, Associated Electrical Industries (Rugby) Ltd, Rugby, Warwickshire.

ASSISTANT INFORMATION OFFICER. The REED PAPER GROUP has a vacancy for an Assistant Information Officer in the Paper and Board Division Development Department at Aylesford, Kent. Duties will include abstracting and indexing, preparation of literature surveys, answering technical inquiries and some proof reading of reports. Conditions of service include a non-contributory pension scheme and assistance with house purchase, if required. Replies stating full details of qualifications, experience and present salary should be addressed to: Group Personnel Officer, Albert E. Reed & Co. Ltd, Larkfield, Maidstone, Kent, quoting reference AIO/PBDDD/11.

QUALIFIED LIBRARIAN, with some experience of industrial or reference libraries, required as Departmental Librarian. Interests to be served include computer and electronics research and development. Good salary and staff conditions. Contributory pension scheme. Canteen. New modern building. Application to Personnel Officer—Women, FERRANTI LTD, Western Road, Bracknell.

WHESSOE LIMITED require a TRANSLATOR for the library staff to translate correspondence and technical material into English. The languages concerned are mainly French and German but Scandinavian languages, Spanish, and Italian may also be needed. The field covered is general engineering, welding, and metallurgy. Send brief relevant details, quoting reference 79/64, to the Personnel Manager, Whessoe Limited, Darlington.

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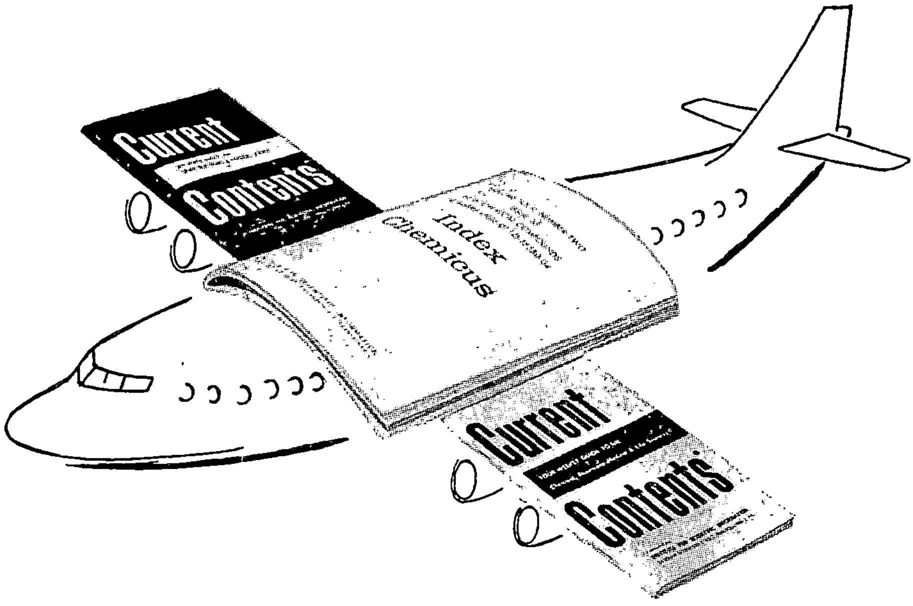

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Aslib Proc. vol.14 no.6 pp.137-180 London, June 1962

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There's a man in Oxford

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 June 1962 Number 6

ASLIB CALENDAR

July

TUE.3. Advanced course on patents (repeat).
Aeronautical Group sherry party at Royal Aeronautical Society.

THUR.5. Furniture Group annual general meeting at Shoreditch Public Libraries.

FRI.6 – SAT.7. Northern Branch conference in Liverpool.

September

THUR.20. Technical Translation Group meeting at Aslib.

October

TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.

November

THUR.8. Technical Translation Group sherry party at Aslib.

FRI.16. Northern Branch conference in Bradford.

December

THUR.6. Technical Translation Group meeting at Aslib.

Aslib Year Book

Publication of the *Aslib Year Book* is to be discontinued. A full and up-to-date list of Aslib members will be published in 1963.

Midlands Branch

The Annual General Meeting was held on 28th March at the Engineering Centre, Birmingham. Officers elected for the year 1962–63 are as follows: Chairman, Mr D. R. C. Whale, Tube Investments Ltd; Vice-Chairman, Mr A. Nicholls, University of Birmingham; Hon. Treasurer, Mr C. P. Auger, Joseph Lucas (GTE) Ltd; and Hon. Secretary, Mr J. Seals, College of Advanced Technology, Birmingham. Elected members of the Committee are Mr J. L. Atkins, Mrs E. R. Branson, Miss D. R. Dawson, Mr E. S. Fox, Miss K. Mallalieu, Mr K. J. Rider, Mr F. J. Stanley, Mrs S. M. T. Stone, and Mr C. A. Wise.

Northern Branch

An 'itinerant' conference will be held in Liverpool on Friday and Saturday, 6th and 7th July. Delegates will assemble at 2.30 p.m. on Friday at Liverpool Public Libraries, William Brown Street. Dr G. Chandler, City Librarian, will give a talk on 'The new Picton and Hornby libraries' which will be followed by a tour of the libraries and administration building. After tea, Detective Chief Inspector S. Weeks, Liverpool City Police, will talk about 'Classification: its use for fingerprints, and future developments'. Delegates will then be taken by coach to the Hotel Victoria, Heswall, for dinner, and Mr N. L. Angel, of Shell Research Ltd, will give a survey of technical inquiry records at Thornton Research Centre over the last ten years. The programme for Saturday will open at the Hotel Victoria with talks by Mr G. A. Davison of United Steel Companies Ltd on the desirable ratio of professional to non-professional library staff; and by Mr K. Swallow of the English Electric Co. Ltd on 'Professional and non-professional training'. After lunch delegates will be taken by coach to Canada Dock to board a steamship of the Pacific Steam Navigation Company where Mr H. L. Storrs, of the Company, will give an informal talk, followed by a tour of the ship.

Aeronautical Group

A sherry party will be held on Tuesday 3rd July at the Royal Aeronautical Society to enable members to meet members of Agard Documentation Committee of NATO. Any Group members who would like to attend this party are asked to contact the Hon. Secretary, Miss M. Dyke, Royal Aircraft Establishment, Bedford, telephone Bedford 67411, telex 82117, as soon as possible.

Fuel and Power Group

The annual general meeting was held at Aslib on 15th May. Officers and committee members were elected for the coming year as follows: Chairman, Mr F. Hickman; Hon. Treasurer, Mr H. C. Claxton; Hon. Secretary, Miss G. E. Hargreaves; members, Mr G. E. Austen, Mr J. J. Eyre, Dr Charles Forrester, Miss M. Gossett, Mrs M. R. S. Johnson, and Mr K. P. Waller.

Textile Group

The Annual General Meeting was held on 10th May at the Wool Industries Research Association, Leeds. Nineteen members attended. Mr W. Ashworth, British Nylon Spinners Ltd, was re-elected Chairman of the Group and Mrs M. I. Lomax, Research Department, Tootal Broadhurst Lee Company Limited, 56 Oxford Street, Manchester 1, was re-elected Hon. Secretary. After the business meeting members enjoyed a tour of the laboratories and library of the Wool Industries Research Association.

American Library Award for C. W. Cleverdon

Cyril W. Cleverdon, Librarian, College of Aeronautics, Cranfield, and Director of the Aslib Cranfield Research Project, is the first European to receive the Professional Award of the Special Libraries Association (SLA), its highest honour. In presenting the award, the SLA President praised Mr Cleverdon's work in directing a comparative study of the efficiency of four systems of indexing periodical and unpublished report types of technical literature for information retrieval, and said that the objective of the study, conducted under the guidance of Aslib and with the financial assistance of the US National Science Foundation, was to arrive at a body of facts to replace the folklore existing previously. During the course of the investigation, a standard of measurement and a method of measuring the efficiency of indexing systems had been developed. Unfortunately Mr Cleverdon was unable to receive the award in person.

British National Film Catalogue

Should Britain have a national film catalogue—doing, for the thousand films of all kinds which this country produces every year, the same job as is done for British books by the *British National Bibliography*?

This question is asked in a brochure of the British Film Institute enclosed with this issue. If enough affirmative answers are received by the end of July the Institute proposes to start publication early in 1963. At present the thousand films are spread over a large variety of catalogues published by many organizations and much research is often needed by users at home and abroad to discover what is available. A national catalogue embracing all films would be a great saver of time and trouble and would provide a basic reference tool for all persons and organizations making and using films for any purpose.

A recommendation that national film catalogues should be published was made last year by an international conference on the distribution of educational, scientific, and cultural films convened by the Council of Europe. A committee representative of government departments and national film organizations has studied the proposal and requested the British Film Institute to undertake the compilation and publication of the British catalogue if sufficient support is forthcoming to allow it to be launched on a self-supporting basis. Aslib has been associated with the proposal since it was first put forward. Similar projects are under way in France, Germany, Italy, the Netherlands, Belgium, and other countries.

The brochure, which is available from The British National Film Catalogue, The British Film Institute, 81 Dean Street, London W1, invites recipients to subscribe six guineas a year for six fully indexed bi-monthly issues and an annual cumulative volume which will provide comprehensive basic information about every film completed in the preceding period.

Information Courses

A series of two-day 'appreciation courses' on methods of handling information has been initiated by Messrs J. L. Jolley and Partners Limited. The syllabus includes a theoretical session on the principles of indexing; exercise in indexing by two different methods; a theoretical session on classifying information with relation to the equipment to be used and types of questions to be answered; and a demonstration of equipment and systems in operation, followed by discussion. Further courses are to be held at the Bell, Aston Clinton, on 4th and 5th July, 19th and 20th September, and 14th and 15th November. The course fee is 16 guineas. Further information about the courses, travel arrangements, and overnight accommodation, if required, can be obtained from J. L. Jolley and Partners Limited, 46–48 Frogmoor, High Wycombe, Bucks.

Russian for Scientists

Ealing Technical College offers two courses in Russian in the 1962–63 syllabus. Both courses are designed to enable scientists, technologists, and special librarians to scan or translate and the language is taught through the medium of science texts. Students are encouraged also to speak Russian. Course 1, for beginners, will be held on Monday and Thursday mornings and Course 2, for those with some knowledge of Russian, on Tuesday and Friday mornings. The fee for each course is £4 10*s*. It is possible also to arrange classes for special groups on their own premises for firms and organizations who can provide for this. Further details and application forms for courses are available from the Head of Department of General Studies, Ealing Technical College, St Mary's Road, Ealing, London W5.

Careers Guide for Girls

The British Federation of University Women has issued a revised edition of its pamphlet *Opportunities for girls and women in science and technology.* It gives succinct accounts of the various professions, with details of qualifications required and some indication of salaries and prospects. A well written section on technical librarians and information officers is included. Much of it would be equally useful to a young man, and it compares favourably with more ambitious publications in the same field. It is available price 3*s* 6*d* from the British Federation of University Women, Crosby Hall, Cheyne Walk, London SW3.

Standard on Plastics Abbreviations

The British Standards Institution has recently published a *List of common names and abbreviations for plastics*. The list is intended to help the general public and the retail trade to identify plastics materials by their correct common names. Thirty-six common names are listed together with their abbreviations and basic materials. Manufacturers selling material under trade names are recommended to include the common names in descriptions of materials. A more comprehensive standard is in preparation to cover nomenclature for technological use. BS 3802 : 1962 *List of common names and abbreviations for plastics* is available, price 3*s*, from the British Standards Institution, British Standards House, 2 Park Street, London W1.

Ink for Permanent Records

The British Standards Institution has issued a *Specification for blue-black record inks* for the benefit of those persons and organizations who are required, by law or for convenience, to make 'permanent' records which may be kept in a legible form for a long time. It is claimed that ink conforming to this standard, used with a steel-nibbed pen and allowed to dry naturally, will remain practically unchanged for upwards of a hundred years. BS 3484 : 1962 *Specification for blue-black record inks* is available, price 3*s*, from the British Standards Institution, British Standards House, 2 Park Street, London W1.

Unesco Publications List

The *General catalogue of Unesco publications and Unesco sponsored publications 1946–1959* lists over 2,300 works produced throughout the world with the organization's assistance, whether published by Unesco, by some other body under contract, or under Unesco auspices. Although intended as a work of reference, it will offer also an insight into the breadth of Unesco's activity in the field of publishing. It contains a list of publications classified by UDC, list of filmstrips and art slides, general index, list of publishers, and list of national distributors. It is available from HMSO and the national distributors, price 5*s*; $1; 3.50 NF.

National Science Foundation Projects

The National Science Foundation (NSF) in Washington reports a number of NSF-sponsored activities in the field of scientific information processing and dissemination:

1. A project to study the future role of scientific abstracting, indexing, and information services in the United States.
2. An experimental study of convertibility between two different indexing vocabularies, i.e. the technical indexing and retrieval vocabulary used by the Armed Services Technical Information Agency and that of the Atomic Energy Commission.
3. A study of the potential value of research libraries to their regional scientific communities, initiated by West Virginia University, with the object of improving research library co-operation in general.
4. A literature survey, conducted by the American Institute of Biological Sciences, to determine the percentage of published biological research supported by the Federal Government.
5. A study of factors governing the announcement and publication of government-sponsored research reports has been completed. The report

contains data relating to origination, announcement, and publication, together with time intervals involved among separate federal agencies.

Dewey Classification for Advertising

A revision of the advertising portion of the Dewey Decimal Classification system has been published by Meldrum and Fewsmith, Inc. The project was undertaken in conjunction with Western Reserve University School of Library Science. The new classification is intended to fit into the section 657.1 Advertising of the Dewey scheme and is sub-divided into main subsections of Principles, Organizations, Advertising Types, Creative Techniques, Advertising Production, Media Selection and Use, Publicity and Public Relations, and—possibly the most important—Results. Copies of the new classification may be obtained by writing to Meldrum and Fewsmith Inc., Cleveland 15, Ohio, USA.

Birthday Honours

Members will be delighted to know that Mrs Joyce Lancaster-Jones was appointed M.B.E. in the Birthday Honours list. Mrs Lancaster-Jones was Hon. Secretary to Aslib from 1955 to 1960 and is an elected member of Aslib Council.

Other honours of special interest to Aslib are the appointment to O.B.E. of Major C. W. Hume, Secretary-General, Universities Federation for Animal Welfare; Mr E. Lindgren, Curator, National Film Archive; and Mr K. Headlam-Morley, Secretary, Iron and Steel Institute.

NEW MEMBERS

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NEW MEMBERS—*continued*

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Market Research Society	London	Miss D. A. Jack
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Newman Demographic Survey	London	A. E. C. W. Spencer
North-East Essex Technical College & School of Art	Colchester	G. Nelson
North-East Metropolitan Regional Hospital Board	London	F. P. G. Biggs
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Wolverhampton Technical Teachers' College	Wolverhampton	E. A. J. Turner

INDIVIDUAL

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B. J. Read	Bicester
J. Scott	London
R. L. Stephen	Scotland
J. A. Tvedt	Epsom
Miss R. Vainstein	Canada

CONFERENCE ON THE COMMON MARKET

Implications for Information Services

London, 22nd March 1962

DR HUGH THURSTON, Head of European Department, Binder, Hamlyn, and Fry & Co. Limited, welcomed delegates on behalf of Aslib and said that this was a conference with a difference: it was a conference of specialists for specialists—for information officers whose job was the collection and dissemination of information.

The point of the conference was not to discuss whether it was a good thing or a bad thing to go into the Common Market. Its purpose was to study the broad effects of the existence of the Common Market on information officers and their services. He drew attention to the exhibition of literature on the Common Market and on the organizations associated with the EEC, arranged by Aslib Economics Group Committee.

The first part of the conference would be devoted to papers and discussion on the shorter-term aspect of the Common Market from the point of view of information officers. That would be followed by a discussion period; they would then pass on to consider the longer-term aspects. It was the intention that during the panel discussion period after lunch there would be the opportunity to discuss at length some of the questions which many of the audience had kindly sent in, and he hoped, therefore, that the questions after each paper would be as short and precise as possible.

He stressed that it was most important that delegates should indicate where their difficulties lay. This was a two-way traffic. It was in the nature of a preliminary conference. Many of them were aware of the difficulties of disseminating and collecting information on the Common Market, but it would be interesting to learn what other people's difficulties were and whether they had had a common experience or not.

He had noticed that at this type of conference the chairman often disclaimed any connection with the subject; this was no doubt intended to assure the audience of his independence. Unfortunately, he could not make any disclaimer of this type. In his work as a European adviser he was inevitably concerned with affairs in the Common Market, but he could assure delegates of his impartiality and was just as interested to hear what the speakers had to say as were, no doubt, the rest of them.

The Chairman then introduced the first speaker, Dr Roy Pryce.

THE EUROPEAN COMMUNITIES

their work and publications

ROY PRYCE, M.A., PH.D.
Head of the London Office, Information Service of the European Communities

In signing the treaties establishing the three European Communities—the European Coal and Steel Community (ECSC), the European Atomic Energy Community (Euratom) and the European Economic Community (Common Market)—the six member countries have set in motion a complex and far-reaching process which has already had many repercussions far outside the immediate sectors covered by these formal documents. How far the process will lead, especially in its political implications, we do not yet know, but already the ramifications of integration present many new problems to those concerned with information about its economic consequences.

My purpose in this paper is to sketch in briefly the official sources of information which are available from the Communities themselves, and especially those concerning the work of the European Economic Community. Naturally enough, these sources are very largely concerned with the implemention of the treaties: they do not, that is, cover many areas of industrial information which are now increasingly of interest to British firms. A knowledge of the programme of the Rome Treaty and the institutional framework of the Community, however, is essential for an understanding and evaluation of present trends within the six countries. An indication of the sources of an introductory documentation on the aims and objectives of integration may therefore be of help for the person who approaches the subject for the first time.

INTRODUCTORY MATERIAL

A number of publications of the Joint Information Service of the European Communities are of particular value. Written for the non-specialist they provide the basic framework around which more detailed information can later be assembled.

The following provide a comprehensive introduction to the origins, aims and achievements of the three Communities:

The Facts, 2nd edition, 1960. A brief, twenty-three-page schematic presentation of the aims, institutional structure, and achievements of the three Communities. It contains, among other things, an outline timetable for the achievement of the customs union. A third edition is in course of preparation.

The European Community 1950–60. An illustrated, chronological account of the first ten years of the movement for integration.

The Common Market. A forty-eight-page brochure which reviews progress up to the end of 1961. This publication is on sale, price 1*s*.

ECSC. An illustrated account of the work of the European Coal and Steel Community.

Euratom. A comparable account of the European Atomic Energy Community.

In addition, the Information Service also publishes from time to time accounts of particular aspects of the work of the Community. A number of these appear in an occasional series entitled 'Community Topics'. Those so far published are: no. 1, *The Common Market 1960–61.* (Introduction to the Fourth General Report on the EEC Commission); no. 2, *Economic integration and political unity in Europe,* by Walter Hallstein; no. 3, *A guide to the study of the European Community* (first edition now out of print, a revised edition is in preparation); and no. 4, *The Common Market and the Law,* by Michel Gaudet.

Other aspects are dealt with in occasional brochures and folders. Current titles include:

The European parliament, an illustrated brochure of the work of the 142-member assembly.

The European Development Fund, 1959–61, a folder containing a series of coloured maps and charts showing the activities of the Fund in the overseas associated countries in Africa.

The Six in figures, a folder of useful statistics.

For the general reader, a regular account of the development of the three Communities is provided by another of the Information Service's publications, the monthly *Bulletin from the European Community.*

With the one exception noted above, these publications are obtainable from the London Office of the Information Service, free of charge.

BASIC DOCUMENTS

The Treaties

The detailed programme of integration is laid down in three basic documents obtainable from HMSO:

Treaty of Paris, 18th April 1951, Establishing the ECSC;

Treaty of Rome, 25th March 1957, Establishing Euratom; and

Treaty of Rome, 25th March 1957, Establishing the EEC, i.e., the Common Market.

The English versions of these treaties are unofficial translations and should therefore be treated with care, especially that of the EEC which contains a number of inaccuracies. The valid texts are in the four Community languages: French, German, Italian, Dutch.

The EEC Treaty, unlike that of the ECSC, is a 'framework' treaty—that is, it establishes objectives but on many issues leaves precise details to subsequent decisions. The work of the Community's decision-making institutions is therefore of great importance.

Journal Officiel des Communautés Européennes

Decisions in the EEC are taken by the Council of Ministers (on all major issues) or by the Commission. They are published in the *Journal Officiel.* This appears in the four Community languages (not English) and can be purchased through HMSO. An English translation of the more important decisions now appears in the Bulletin of the European Economic Community (ten issues a year, from HMSO).

For most major decisions the Community procedure is that the Commission first establishes a proposal for transmission to the Council of Ministers. These proposals are made public and may be obtained in French, in a Roneo form, on application from the London Office. Most of them are now also published in the *Bulletin of the EEC,* though there is usually some delay in the appearance of the English version. On many issues the process of decision-making may be further followed through the reports and discussions of the European Parliament, to which the Council transmits the Commission's proposals, and also in the discussion of the Economic and Social Committee.

THE COMMON MARKET IN ACTION

The two major sources concerning work in progress are:

. *General Report of the EEC Commission,* which is published annually in the spring. This contains a comprehensive survey of the work of the past twelve months and its introduction is a valuable guide to the future policy of the Commission.

Bulletin from the EEC, which is published ten times a year, both in the official Community languages and in English. This surveys the work of the departments of the Commission and frequently contains articles on major issues by members of the Commission. It is an indispensable tool for all who wish to follow the progress of all the Community in detail.

With regard to the detailed implementation of the Treaty of Rome, the following brief notes indicate in outline the present situation. It will be recalled that in January this year the Community formally entered Stage Two of its timetable as laid down in the Treaty. The significance of this step, together with an outline of what had been achieved during the first four years and the programme for the next four is examined in a special issue of the *Bulletin from the European Community,* February 1962.

Free movement of goods

The achievement of the customs union, for which a detailed timetable is laid down, requires the gradual abolition of tariffs and quotas (and equivalent restrictions) on trade between the member states, and the substitution of a common external tariff towards the rest of the world for existing national tariffs. Progress in the achievement of these aims has so far been considerably more rapid than was foreseen under the Treaty's timetable.

Internal tariffs on industrial goods have already been reduced by 40 per cent, while those on non-liberalized agricultural products have gone down by 35 per cent, and those on liberalized agricultural products by 30 per cent. It is expected that a further 10 per cent reduction of tariffs on industrial goods will be made on 1st July 1962, with further reductions being applied at the same time to certain agricultural products.

Quotas were abolished at the end of 1961, eight years ahead of schedule. Agricultural quotas, in those cases where they have not been replaced by internal levies, follow the rules for their enlargement laid down in the Treaty. Special provisions are made with regard to those restrictions imposed by state monopolies: these are in general being modified to give freer access to other Community producers.

The Community published in January 1961 its future common tariff—*Tarif douanier des Communautés Européennes*—but this now needs amendment in the light of the recent GATT negotiations, many positions having been reduced. The first approximation of national tariffs to the common external tariff was made at the end of 1960, on the basis of the future tariff reduced by 20 per cent. The next step is due to be taken at the end of Stage Two but may be brought forward. The common tariff will be applied in full at the end of the transition period. Under the Treaty this may be at the end of December 1969 or, at the latest, December 1972. The Council has power, however, to shorten the transition period.

National customs authorities publish current rates of duty. The Commission may grant tariff-free quotas for a limited period of time: details are given in the *Journal Officiel*. The only item for which no common tariff has yet been agreed is refined petroleum products.

Agriculture

Decisions taken by the Council of Ministers at the beginning of this year have instituted a common policy for the whole of the Community for a series of products covering the major part of the Community's agricultural production. The aim, over the transition period, is to arrive at a common internal market and a common form of external protection. In a number of cases internal levies are replacing previous forms of national controls from 1st July 1962, these being gradually tapered off. On several major products, including cereals, a variable external levy is replacing national tariffs.

The official text of the decisions to be published in the *Journal Officiel*. A supplement to the March *Bulletin from the European Community* contains a general summary of the decisions, product by product. Further decisions, including those concerning the level of grain prices, are due to be taken this year.

Free Movement

Workers: a first Regulation, no. 15, published in the *Journal Officiel* on 26th August 1961, came into force in September 1961. This outlines the three-stage transition period and the specific measures to be taken during the first two years.

Right of establishment: a General Programme, published in the *Journal Officiel* on 15th January 1962, sets out the timetable by which this is to be achieved and outlines the measures to be taken.

Free offering of services: a General Programme was published in the *Journal Officiel* on 15th January 1962.

Capital: an initial regulation was published on 12th July 1960. The Commission is actively considering further proposals.

Transport

The Commission has published (May 1961) a memorandum suggesting the lines on which a common policy might be formulated: no decision has yet been taken. Rate discrimination based on the origin or destination of goods has, however, been abolished. (Regulation no. 11, published in the *Journal Officiel* on 16th August 1960.) The member states have also agreed on a consultative procedure before introducing new legislation, etc., on transport matters.

Common rules

Competition: Regulation no. 17, published 21st February 1962, prescribes the rules for the application of Articles 85–6: Control of cartels affecting intra-Community trade and abuse of dominant positions.

Dumping: Regulation no. 8, published on 25th March 1960, deals with the application of Article 91 (2).

State aids: details of the Commission's activities in this sphere are given in the *General Report* and the *Bulletin of the EEC.*

Fiscal provisions: work in this sphere is still at a preliminary stage: details of the various studies undertaken are given in the publications mentioned above.

Approximation of laws: this section of the treaty, though couched in very general terms, covers an extremely wide range of activity. For the most part, work is still at the stage of preparatory studies, though in certain fields these are already well advanced. Proposed action covers such matters as a convention on bankruptcy, and others on trade marks and patents. Studies are also proceeding on a harmonization of standards in various fields, including transport. Details of work in progress may be found in the *Bulletin from the EEC.*

Economic policy

Economic trends: as part of its work in keeping a close eye on developments in the Community's economy, the Commission publishes a quarterly survey of the economic situation in the Community and monthly *Notes and Graphs* on the economic situation in the Communities. Subscriptions can be arranged through HMSO.

Commercial policy: a consultation agreement between member states providing for an exchange of information and projected agreements is now in force. In practice the Community already acts as a single unit in tariff negotiations in GATT, though a comprehensive common policy in this sector has still to be worked out.

Social policy

Equal pay: a new timetable was agreed by the Council of Ministers at its session in December 1961. The maximum differences are to be reduced to 15 per cent by 30th June this year, and to 10 per cent by 30th June 1963. All discrimination is to be eliminated by 30th December 1964. The results of a survey on the subject in the Community countries were published by the Statistical Office in *Statistiques sociales,* no. 1, 1961.

Social security of migrant workers: this has been the object of an agreement between member states and detailed documentation on the rights of migrant workers has been published by the Commission.

Annual survey: a valuable review of employment developments, trends in working hours, wages, social security schemes, etc. is given each year in the *Exposé sur la situation sociale,* annexed to the Commission's general report. So far no English translation has been made.

Social fund: the implementing regulation is no. 9, published 31st August 1960. Details of its operations are given in the *General Report* and the EEC Bulletin.

The Statistical Office of the Communities publishes a valuable series of *Statistiques sociales* dealing with such matters as housing, wages, social charges, etc.

Investment Bank

An annual report is issued, as well as press releases on the occasion of loans, etc. Inquiries may be made direct to the bank at 11 Mont des Arts, Brussels.

Overseas Association

This is currently being renegotiated as the Implementing Convention runs out at the end of 1962. Details of the work of the Development Fund are given in the *EEC Bulletin.*

SOURCES OF FURTHER INFORMATION

Information Service of the European Communities

The London Office is at 23 Chesham Street, SW1, telephone Belgravia 4904, Telex 23266 EURODELEG London. Similar offices are to be found in Paris, Bonn, Rome, The Hague, and Washington. The headquarters of the Service are at 244 rue de la Loi, Brussels, and 18 rue Aldringer, Luxembourg.

Publications Service of the European Communities

Official catalogues are published from time to time. They may be obtained free of charge either from the London Office of the Information Service or direct from the Publications Service, 2 place de Metz, Luxembourg. In the United Kingdom the official sales agent is Her Majesty's Stationery Office. Inquiries should be made to HMSO, Agency Section, P.O. Box 569, London SE1.

Statistical Office of the European Communities

Catalogues are obtainable from the London Office of the Information Service or direct from the Publications Service. Subscriptions may be arranged either directly or through HMSO.

European Parliament

A certain number of its publications are available through HMSO. Direct inquiries should be made to the Division de la documentation parlementaire et de l'information, 19A rue Beaumont, Luxembourg.

Court of Justice

The proceedings of the Court are published in a series entitled Recueil de la jurisprudence de la Cour. Details are given in the catalogue of official publications. Direct inquiries may be made to the Service de documentation de la Cour de Justice, 12 Côte d'Eich, Luxembourg.

DISCUSSION

The Chairman, after thanking Dr Pryce for his talk and expressing appreciation of its admirable clarity, said that it was the intention of Aslib that most of the discussion should appear in the proceedings, together with some of the points covered in the bibliographies. Dr Pryce had referred to the information on the table. It was a tribute to this country and an indication of the Communities' interest in it that all this information was free. It was interesting, too, that one of the difficulties in these initial stages in dealing with the Common Market was that so much information was not available in English. This was a point that some delegates might wish to raise, although presumably this would be rapidly remedied after entering the Common Market.

Mr J. J. Eyre (Assistant Information Officer, Powell Duffryn Ltd) said that his organization was not in possession of a number of the publications mentioned by the speaker. It seemed to be very difficult to find out what was available unless one met somebody like Dr Pryce who could give the information personally. Was there any system by which people could inform themselves of what exactly was available, apart from private bibliographies?

Dr Pryce, in reply, referred to the official catalogue of the Community's publications, which was brought up to date from time to time. A copy of this was in fact on the table.

Mr Peter Spiro (Librarian, Institute of Bankers' Library) referred to the work of Europe House. If Dr Pryce's organization were an 'embassy', Europe House was perhaps a sort of voluntary body and clearing house. Many of them would have come across the booklet dealing with Europe House, which was a voluntary, non-profit-making organization, having the support of industry, banking, and trade unionism, and acted as a sort of information centre in relation to Europe and the Common Market. He had the Secretary's authority to say that he would certainly welcome any questions from any of them. It might indeed enable Dr Pryce to be less occupied with inquiries if some of the work could be split between the two organizations. As a diplomat, quite clearly Dr Pryce could not mention this kind of organization officially, but did he feel that it was a helpful body in that way?

Dr Pryce, in reply, said that he had deliberately not mentioned any of these sorts of bodies, because he had been asked to confine his remarks to the Community's own publications, but clearly there were a number of bodies which might be helpful in various ways. He hoped that the paucity of the questions was an indication that he had satisfied everyone!

The Chairman then introduced the next speaker, Mr Ian Ross, to whom they were indebted for the excellent bibliography,* of which they all had a copy. Mr Ross had intensive experience in the collection and preparation of information on the Common Market and had built up an excellent library and information service, with a strong accent on the affairs of the Community.

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* The Common Market; a select bibliography—a limited supply of this is available from BNS Economics Library, 68 Knightsbridge, London SW1.

STATISTICAL AND OTHER INFORMATION SOURCES

IAN ROSS, B.A.
Economics Information Officer, British Nylon Spinners Limited

As part of this one-day conference we have prepared an exhibition of some of the more important sources giving statistical and other data on the Common Market. *A Guide to sources of statistics in Common Market countries** has been prepared by the Economics Library of British Nylon Spinners Ltd in collaboration with members of the Aslib Economics Group.

Now, in the very short time available I am not proposing to take each of the statistical and other publications in turn and discuss with you their merits or demerits. What I am proposing to do is to summarize the main sources of economic information and from the vast amount of material available, make one or two personal recommendations, based on experience gained from visits to the various industrial, commercial, and research organizations in the EEC countries and also to the headquarters of the EEC Commission in Brussels.

For the time being we shall put to one side the official statistical publications about which I shall be speaking later. Once one has discovered, in broad terms, what the Common Market is about, and there is already a mass of material on this subject, the first thing one wishes to do is to follow the progress being made during the negotiations about the regulations under the various Articles of the Treaty of Rome, and it is of equal importance to follow the thoughts and opinions of industry towards these regulations. The first thing needed, in order to have any hope of understanding what it is all about, is a copy of the *Treaty establishing the European Economic Community and connected documents.* (In case there are any of you not aware of this document it is, in theory, available from HMSO for 10*s*; although recently when I tried to obtain an extra copy it was out of stock.) As Dr Pryce has already mentioned, it is better to have it in the original language.

When it comes to following the negotiations, there are two main official publications—the *EEC Bulletin* published by the EEC Commission, and the *Journal Officiel des Communautés Européennes* which covers the EEC, Euratom, and the Coal and Steel Community. Both these publications have one great fault and that is the long delay between the actual event and its appearance in print. There are of course other official documents of the EEC which give this information considerably earlier, for example a whole series on the Commission's recommendations to the Council, and it is sometimes possible to obtain these in advance but officially they are internal documents and difficult to get hold of until they have been released by the Commission. In order to overcome these delays I would recommend to you a daily publication entitled *Europe* which is issued in several languages, including English, by Agence Internationale d'Information pour la Presse, in Luxembourg. This consists of several sections, one of which is called *Europe Documents* and gives, in full, the text of regulations under the various articles of the Treaty of Rome and, of course, these appear in English. I would like to take a recent example to illustrate the advantage of this service. We received a full translation of the text of the first set of regulations for the application of Articles 85 and 86 of the EEC Treaty—'Rules of Competition applying to firms'—in *Europe Documents* on 3rd January 1962. These subsequently appeared in the EEC official journal of 21st February, to which there was a reference in the *Financial Times* next day. They finally appeared in the *Board of Trade Journal* dated 9th March.

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* A guide to the sources of statistics in Common Market countries. See Appendix.

Another advantage of *Europe* is that it gives, very quickly, summaries in English of special reports issued by the EEC Economic Section which do not appear in this country for some time, and about which I shall be talking later. There is one snag about it and that is the price, which is about £100 p.a. It is, however, very useful and informative and was recommended to me by officials of the EEC Commission, who added that they dreaded seeing anyone from it in their building because of its sometimes embarrassing premature disclosures—which, incidentally, they blame on the Italian waiters.

Another publication which is very good is *Common Market News* (Comtelburo Limited). Besides reviewing the activities of the Commission, it reports on industrial developments in the EEC countries, often giving useful statistics. It also gives details of trading and other agreements made between firms in different countries, tested by type of product.

In addition to *Europe* and *Common Market News,* there are of course several other publications of a similar type. Each of these contains some articles of interest. For example, the *Revue du Marché Commun* some time ago published a series of articles on the European chemical and other industries and has also published articles by leading international authorities on trade marks, standardization of laws, control of sales in the Common Market, and similar problems.

Probably the best of these publications is *Opera Mundi Europe.* It has an extremely well-informed letter from Paris, a section on industrial developments, and an economic section, entitled 'Trends and analyses', that contains statistical information on a wide range of subjects; recently, for example, there has been an article on EEC price and wage trends. Unfortunately, *Opera Mundi Europe* is no longer published in this country. It is, however, still published in Paris in French and it is possible to enter a subscription to it. The former English edition was in fact a translation from the French edition.

In the next group of material I should like to consider are the publications of semi-official and non-official bodies. The first part of this group is concerned with the publications of bodies similar to our own National Institute of Economic and Social Research and the second part is concerned with industrial and commercial organizations. It is worth remembering, I think, that in certain countries where the normal official statistics are not good these organizations are often the only source of particular statistics for specific industries. Often, however, they are given in the form of indexes but, when there is no alternative, they are better than nothing. I should particularly like to mention the IFO Institut, Munich; ISCO Instituto Nazionale per lo Studio della Congiuntura; SVIMEZ Associazione per lo Sviluppo dell Industria nel Mezzogiorno Centro per gli Studi sullo Sviluppo Economico, Rome; and the Hamburgisches Welt-Wirtschafts Archiv, Hamburg.

The IFO Institut produces two main publications:

1. A weekly rapid service, *Schnelldienst* which gives a survey of the current economic situation, prospects for industry, articles on the wholesale and retail trades, prices, labour conditions, and investment activity in industry.

2. A more detailed quarterly publication, *Wirtschafts Konjunktur* (Economic Trends) which, apart from reviewing economic developments, contains international articles and studies on such matters as consumer expenditure, industrial production, stocks and orders in industry, and prices.

Appearing with the quarterly publication are two statistical supplements covering the normal economic indicators and, in index form, production and prices by sections of industry. In the larger of the statistical supplements there is a very detailed breakdown by individual industries and products covering production, turnover, employment, and wages, manufacturers' selling prices, export trade and retail prices. These are frequently given in terms of value although in some cases particular manufacturers' prices are in index form. They do, however, bring together in one place a wide range of useful statistics.

In addition to their normal publications, they undertake specific surveys and have contact with about 9,000 industrial organizations. They undertake market research for production and investment goods, although it is now proposed to separate this particular work from the main Institut. They also hold a continuous survey based on direct contact with members on the economic situation and developments in some 450 branches of industry (household goods, electrical goods, textiles, clothes, toys, glass, and private cars, etc.). The findings are published monthly in *Konjunkturspiegel.* These and other services, however, are only available to members. It is possible for United Kingdom companies to join the Institut.

A similar organization in Italy to the IFO Institut is ISCO. In addition to specific monographs they produce a monthly bulletin entitled *Congiuntura Italiana,* which contains a review of the Italian economy, special articles, and a long-term series of statistics and graphs covering the major economic indicators and industrial production by industry—the latter figures not being available elsewhere.

Another Italian organization which produces useful economic material is SVIMEZ, which is a private non-profit-making organization chiefly concerned with the economic development of Southern Italy. In the course of this work it has set up an economic research unit which has produced several important studies on such matters as population and labour force projections, consumer expenditure in considerable detail with future estimates, and the distribution of industry. It has extremely good contacts with university staff and with such organizations as the Italian Institute for Studies on Private Consumption and, even if it has not done any work in a particular field, can suggest whom to contact.

There is one other organization that I should like to mention and that is the World Economic Archives in Hamburg the Hamburgischer Welt-Wirtschafts Archiv. This is the largest organization of its kind in Germany, having some 400,000 books, 170,000 company files, and about eight million Press cuttings. It produces several publications, the most important being *Wirtschaftdienst,* which also appears in English in a summary form. This surveys developments in the Common Market, credit and fiscal matters, and frequently has detailed studies on specific German industries.

I would like now to consider the availability of material from industrial and trade sources. Most of you will know from your own experience that official statistics in this country have many shortcomings, and that it is necessary to turn to other sources of information for detailed statistics. In this country the collection of statistics is governed by the Statistics of Trade Act. Unfortunately in order to allay the suspicion of industry, which must take some responsibility for the not-too-happy state of affairs, such stringent provisions were incorporated in the Act that statistics which had previously been readily accessible (for example the L returns of the Ministry of Labour), are no longer available; moreover the Government is generally concerned with the broad overall picture and frequently statistics are not collected in the detail we should like. Even when they are collected by the Board of Trade in considerable detail, e.g. the KS returns (now to be published as the new *Board of Trade Business Monitor* production series) not only are their hands tied because of the Statistics of Trade Act, where there is one major producer, but they also run into difficulty where, as in the leather industry, there are two branches and one is not willing to let the other know its stock position. When we come to consider the Continental official statistics about which I shall be saying something later, we shall meet similar difficulties—notably in the Netherlands where, often, one industry is virtually controlled by one major firm. Unlike the Netherlands where the official statistics are good, in many of the European countries where official statistics are less advanced than our own it is more important than ever to try to obtain statistical information from trade sources. We need, however, to be realistic about this and it would be wrong to expect individual firms and the trade associations to make all their statistical information readily available to possible competitors. There is, however, a wide range of useful statistical and other information which, although not generally available, may in the case of a trade association be distributed to member firms and it is often possible to obtain this type of information. In those countries where neither the trade association nor the Government collects statistics relating to a particular product, it is often possible to obtain estimates based on the experience of members of the trade association and, although inspired guesses are not very scientific, there is more chance that the guess of the trade association is more nearly correct than that of an outsider. In some countries where official statistics are good, notably the Netherlands and Germany, the official statistics being originally supplied by the trade associations, there is often a greater willingness to supply information, the main advantage being that it is nearly always more up to date and sometimes more detailed.

My own experiences, as far as trade statistics for individual industries are concerned, are largely confined to the textile and clothing industries. I have no reason to believe that the textile industry, which is traditionally very conservative, is any more liberal minded than other industries. I would imagine it is well worthwhile approaching trade organizations in your own industries. In Italy, Germany, and the Netherlands the major textile trade associations now send us not only regular statistical publications, but also have made available studies on such matters as inventory cycles, competition from low-cost countries, and the effect of the Common Market on their particular branch of the industry. Without disclosing individual firms' activities, these often useful statistical information and commentaries are not elsewhere available. Even the French and Belgian organizations, who are more reticent, have agreed to send their annual reports which, although they are not as full as we would like, contain information not previously available. It helps if you can offer something in return.

Some of you may be wondering how to obtain details of the appropriate trade associations. I have found two publications very useful: the first is the *Europa Year Book,* published by Europa Publications Limited of Bedford Square, London, which gives details of trade and industrial organizations, research organizations, learned societies, and similar bodies; and the second is a list published by the EEC Commission giving details of the joint industrial and commercial organizations which have formed themselves into Common Market associations. These are broken down by sections of industry and give the name and address of the central body, with details of the names and addresses of the organization in the member countries. The full title is *Répertoirde des Organismes communs créés dans le cadre de la Communauté économique européenne par les associations industrielles artisanales et commerciales des six pays.*

In addition to the publications of the purely trade organizations many of the employers' organizations, similar to our own Federation of British Industry and the equivalent to our Chambers of Commerce, also publish material of interest which is usually quite easy to obtain. Frequently there is no charge.

In Germany the main organizations are the BDI and the various Industrie und Handelskammer. The Deutschen Industrie –und Handelstag is the 'umbrella' organization of the eighty-one regional organizations and its main function is to represent business opinion on matters of importance to the Government.

It will therefore be appreciated that the publications of this organization are authoritative sources of opinion of exceptional importance. The more influential Industrie –und Handelskammer, notably those of Berlin, Düsseldorf, Frankfurt, Köln, Essen, and Hanover, each issues a monthly journal with commentaries on EEC, EFTA, GATT, tariff charges, and similar matters. The Deutschen Industrie –und Handelstag does not itself publish a monthly bulletin but it does, however, issue pamphlets on matters of importance, some recent examples being:

> No. 43, *Europaische wirtschaftsliche Integration: Entwicklung und gegenwartiger Stand unter besonderer. Berucksichtigung von Gemeinsamer Markt und Freihandelszone* (European Economic Integration: development and present status with special regard to Common Market and Free Trade Area).

No. 50, *Die Europaische Wirtschaftsgemeinschaft* (Gemeinsamer Markt.): Eine Kurzfassung fur die Wirtschaft mit wichtigstem statistischem Material und einer Ubersicht uber die uberseeischen Gebiete (The European Economic Community (Common Market)): a brief summary for business and industry with most important statistical data and a survey on the overseas territories).
No. 61, *Wirtschafts -und steuerpolitische Fragen der europaischen Integration: Vortrage, gehalten anlasslich der Sitzungen des Europa-Ausschusses und des Finanz -und Steueransschusses bei der Volltagung der Deutschen Industrie -und Handelstages am* 8. *April* 1959 *in Essen* (Problems of economic and tax policy within the field of European integration: lectures held at sessions of the Committee on Europe and the Committee on Finance and Tax Problems during the 1959 plenary session of the DIHT).

The BDI issues itself a monthly report, *Mitteilungen des Bundesverband der Deutschen Industrie* which, in addition to a commentary, contains a useful statistical section. It also publishes a very detailed annual report reviewing each section of German industry, giving a large amount of statistical data not available elsewhere.

Another German organization worth mentioning is the Deutsche Industrie Institut. This organization publishes a weekly *Economic Report from Germany* which appears in English, a Press handout which appears twice weekly containing industrial news, *Schnelldienst,* and *Rundfunkspiegel* which consists of abstracts of news items that have appeared in the German and world Press.

The Italian equivalent to the German BDI is the Italian Confederation of Industry—Confederazione Generale dell' Industria Italiana. It publishes a news bulletin of the Confederation, *Notiziario della Confederazione;* a monthly review of economic policy, *Rivista di Politica Economica;* a review of labour statistics, *Rassegana di Statistiche del Lavoro;* and a periodical *Orientamenti,* which contains articles on the general economy, industrial production, money and finance, and similar matters. In the appendix to *Orientamenti* are published the complete texts of official statements on Italian and foreign measures of importance; also in this series is a special document section covering such matters as restrictive trade practices and a cost of living index. Similar organizations in France and Belgium also publish useful material.

So far I have confined my remarks to some of the more important non-official sources of economic data. I would like now to look at some of the official statistics, published by international organizations such as the United Nations and OECD, in particular statistical publications of the EEC Commission and those of individual countries.

I would like to start with international trade.

Most of you will be fully acquainted with the main United Nations publications such as the *Yearbook of International Trade Statistics, Commodity Trade Statistics,* and *Direction of International Trade,* and as long as the Standard International Trade Classification is a sufficient breakdown for your requirements you will find these satisfactory. Generally speaking there is no great difficulty over trade figures in the EEC countries; all the countries publish trade returns and, with the exception of Italy, follow the item numbers of the Brussels nomenclature, which is really a tariff classification but the more sensible countries use it also for the grouping of their statistical data, although there is some variation in the degree of breakdown as published. It is often useful to use the appropriate part of the *International Customs Journal* for the country concerned, in order to follow these variations. Annual figures are nearly always more detailed than the monthly figures and it is unfortunate that, unlike in the United Kingdom, it is not possible to obtain provisional figures giving the more detailed annual breakdown on a monthly basis, as is possible from our Customs and Excise by payment of a fee. It is worth bearing in mind that when, for example, the Netherlands or United Kingdom export figures are insufficiently detailed (possibly because of the Statistics of Trade Act) it may be possible to find the breakdown by looking at the destination country's imports, where they may not be so meticulous about hiding information, i.e. a country's export figures are another country's import figures and vice versa.

Of the United Nations publications on other matters, there are two which I would particularly recommend to you, because it is difficult to get comparable data so conveniently. First the *United Nations Demographic Yearbook*, which brings together population figures at time of last census and estimates for subsequent years, including arrangement by age groups, and the *Yearbook of National Accounts Statistics*.

The *Demographic Yearbook* does not, however, contain projections of population. The best source of this information is a very recent publication of the OECD, *Demographic trends in Western Europe and in the United States 1956–1976* which also contains projections by age groups.

All countries produce national income statistics. Unfortunately, in their own accounts they do not all adopt a standard form and comparisons become difficult. The United Nations have endeavoured to ensure uniformity and, where possible, comparable figures are published in the Yearbook. Similar figures, a little more up to date, also appear about once a year as a special supplement to the OECD *General Statistics*.

I would like now to consider official production statistics. These are probably the most important yet most difficult of all official statistics—some countries such as Italy having virtually none, with France not much better. Of international statistical sources probably the most useful, if we ignore the publications of the EEC Commission, are those in the regular series of the OECD although they are usually late in appearing. These consist of special studies, often published at irregular intervals, but a certain number do appear more or less on an annual basis. They cover a wide range of subjects, i.e. nuclear energy, electricity supply, oil and coal, iron and steel industry, non-ferrous metals, engineering, chemical industry, fertilizers, timber, pulp and paper, textiles, and cement industry, to mention only a few. Similarly there are a large number of studies covering agriculture and food; the main source for these statistics is the FAO, who publish a wide range of commodity reports, covering cocoa, fats and oils, wool, hard fibres, carpet wool, grain, rice, sugar, tea, etc.

When it comes to individual countries, Germany and the Netherlands both have good production statistics, probably better than our own.

The Netherlands census of production has recently been revised or, to be more accurate, is in the process of being revised, and in its new form consists of detailed statistics, very similar to our own census, but appearing annually. The German census of production—*Die Industrie der Bundesrepublik* consists of three main parts, which appear regularly: part 1, Beschaftigung und Umsatz (Employment and turnover); part 2, Produktion (Selected products and index); part 3, Die Industrielle Produktion (Industrial production); together with a series of special studies in part 4, eg. Heft 32. Produktion wichtiger Erzeugnisse der verarbeitenden Industrie in Ausland 1950, 1952 bis. 1960. (Production of processing goods industries abroad).

Belgian production statistics are also fairly good and, although there is no separate publication, regular statistics appear in the monthly *Bulletin de Statistique*. When we come to Italy and France we are really in trouble. The Italians hold a census of production only once in ten years, and although they give a lot of information there is little on actual production. It is in fact really an enumeration of establishments. Some industrial statistics do appear, however, in an annual publication *Annuario di Statistiche Industriali.* Similarly, in France, production statistics are supplied by the main trade associations and these appear in *Annuaire Statistique de la France,* their equivalent to our *Annual Abstract.*

There is one other source for European production statistics and that is the industrial statistics of the EEC Commission, *Statistiques Industrielles,* which appears quarterly. This gives a very good range of production statistics, sections of industry appearing in considerable detail. In addition to the normal statistical series, articles on special topics usually appear at the beginning of each issue. For example, in the issue for the second quarter of 1960 there is a detailed study of the rubber and synthetic rubber industries, which not only gives details of production and trade from 1953 to 1959 of both the raw materials and major end-uses in the 'Six' but also lists the major producers, number of firms engaged in the industry, number of persons employed, and other information.

Certain facts need to be borne in mind. The statistical office is fairly young and little information has been published, for example, on methodology. There are also several gaps in the series. It has been very difficult to standardize the official statistics of six countries, but wherever possible this has been done, and where it has not been possible a note of any variation is included. Another difficulty is that the Central Statistics Office of the Netherlands is precluded by law from publishing any information which will show the activities of individual firms. In a country such as this, where major industry is concentrated in the hands of a small number of firms, another problem arises. Both these problems are under active consideration and there is every indication that the statistics will improve.

Statistiques Industrielles is useful not only because it brings together in one place similar statistics, but also because it acts as some guide on availability—if, for example, there are no quarterly figures for Italy, it is a fairly certain indication that none exist. It needs to be borne in mind, however, that the breakdown appearing in the EEC statistics is not always as detailed as in the national statistics. To take an example from my own industry, only totals are given for production of hosiery whereas in the German production statistics they are divided into synthetic and non-synthetic, fully fashioned and circular knit.

Other publications of the EEC which are of importance are *Informations Statistiques*, which contain authoritative studies on a wide range of problems ranging from the automobile industry and petroleum refining capacity to milk production, and a supplementary series in which are included the industrial statistics mentioned above, agricultural statistics, and social statistics. This last, 'Statistiques sociales', consists of special studies on such matters as salaries (*Salaires masculins et féminins*. Statistiques sociales, no. 1, 1961) and family budgets of workers in the Coal and Steel Community (*Budgets familiaux des ouvriers de la CECA* 1956–57, Serie Statistiques sociales no. 1, 1960).

EEC also produces regular trade statistics and has published a key relating the sections of the CST (Classification Statistique et Tarifaire) to the Brussels nomenclature, and the Standard International Trade Classification (SITC).

There is, of course, a wide range of sources on which I have not touched, such as advertizing, directories, and financial newspapers. In the field of consumer expenditure, family budgets, consumer panels, and brand barometers, reliance has to be placed on the work of agencies. This research is usually done on commission and is only available to clients.

A very useful publication with a good bibliography is *Market Research Methods in Europe* (European Productivity Agency of the OEEC) which lists the major market research organizations in the European countries.

I would like to say something very briefly about tariffs. All the countries produce individual tariffs and amendment services but you may find considerable difficulty in receiving these promptly. Few of the amendment services are up to date. I would recommend to you a service called Eurotariff (published by Creative Journals Limited). Its main advantages are:

1. It is available in full or sectionalized form, by sections of the Brussels nomenclature.
2. Each subscriber receives the introduction, description of use, tables A to G, index to the complete Brussels nomenclature irrespective of the number of sections he requires.
3. The guide includes all variations to the Brussels nomenclature which various countries in the Common Market are still using, together with the appropriate variations in tariff.
4. Amendments are issued as they occur, the only delay being in the setting up of the print, and not in receipt of details from the countries concerned (in the languages concerned). The information is received direct from Brussels. If one country delays the issue of its own amendments, the service does not wait, but issues, by countries, those amendments that are available.
5. The service includes the investigations and answering of all questions relating to specific items on which further advice may be required. Any such questions are invited by telephone or letter.

I have tried to bring your attention to the more important sources of European economic and statistical data, but am well aware that there are other sources which I have been unable to cover. In a company as large as British Nylon Spinners, we are fortunate in being nearly self-sufficient in these fields.

The point I am trying to make is that there is no one place where all these sources are readily available to the smaller firm. I know that the Board of Trade and organizations like the National Institute for Economic and Social Research have a lot of this material, but the primary object of these organizations is not the collection and retrieval of economic information for industry, which I think all of you will agree is a highly specialized technique. Nowhere in this country is there an organization of international repute like, for example, the Hamburg World Economic Archives, where one can obtain this sort of information and also direct answers to queries. I would suggest that with the rapid developments in Europe it is no longer sufficient to depend on personal contacts alone, and that there is a need for a central organization of world-wide repute specializing in economic and statistical information. Although it would be impossible for any one organization to be expert in every field, many of the expensive subscription services should be available and so should the basic statistics. In addition, it would seem that whereas an overseas trade association would be unable freely to distribute copies of all their publications, if only on the grounds of cost, it might well be prepared to make its publications available to a central organization. Could not Aslib be that organization?

DISCUSSION

The Chairman said that delegates would have been struck by Mr Ross's glance at the future and his reference to their need for this type of central organization.

In connection with the Eurotarif service to which Mr Ross referred, which was the principal private source of information on the various tariffs in Europe and the common external tariff, it was worth mentioning that owing to the flood of revisions they had received and had been digesting, they had now recast the service in a slightly different form from the one illustrated in the exhibition. They were showing it under country headings now, and it would be published within two weeks.

Mrs T. Parfitt (Deputy Librarian, Royal Institute of International Affairs) said that corporate subscribers to the Institute already had a lot of statistics, and press cuttings from the European newspapers were available, but this service was open only to corporate members.

Mr Ross thought that the subscriptions for some of these services were the greatest problem, particularly for the smaller firms, because they were so very expensive. The Eurotarif service was about £75 and the Europe Agency service could cost about £130 for the full range; this was rather a lot of money for the smaller firms who would not use it very frequently.

Mr J. A. Allder (Unilever Limited) asked Mr Ross whether he was suggesting, from the point of view of the non-official statistics which were collected in the Common Market countries by the various trade associations, that there was a flow of information back to this country from the Common Market trade associations available to United Kingdom associations; could people in this country usefully apply to their own associations here and hope that they were collecting some material from the Common Market countries? Or would they have to go to the information services in the countries themselves?

Mr Ross thought that organizations like the FBI obtained a certain number of these publications, but he was sure from his own experience that though this material was there no one had really asked for it. Inquirers could take it up with their own trade association, so that they would know what sort of information was available from their counterparts. Language might well be a partial barrier.

The Chairman then introduced Mr Birtles. The last two speakers had dealt with the European side of the field, and it was now time to see what the Board of Trade and perhaps other Departments of the British Government might be doing to cope with the needs of information

APPENDIX

GUIDE TO SOURCES OF STATISTICS IN COMMON MARKET COUNTRIES

Frequency of publication is indicated after titles thus:

D = daily
F = fortnightly
Q = quarterly
I = irregularly
W = weekly
M = monthly
A = annually
3A = 3 times a year
2W = twice weekly
B = bi-monthly (i.e. alternate months)

INTERNATIONAL STATISTICS: General

United Nations

Statistical Office of the United Nations, New York.
Commodity Survey. A
Commodity Trade Statistics. Statistical Papers Series D. Q
Demographic Yearbook. A
Direction of International Trade. Statistical Papers Series T. A *and* M
Economic Bulletin for Europe. Q
Economic Survey of Europe. A
Electric Energy Statistics for Europe. A *and* Q
Gas Statistics for Europe. A
Housing and Building Statistics for Europe. A *and* Q
Monthly Bulletin of Statistics. M
Population and Vital Statistical Report. Statistical Papers Series A. Q
Statistical Yearbook. A
Timber Bulletin for Europe. Q
Transport Statistics for Europe. A
Yearbook of International Trade Statistics. A
Yearbook of National Accounts Statistics. A

Organisation for Economic Co-operation and Development

Publications de l'OECD, 2 rue André-Pascal, Paris 16e.
STATISTICAL BULLETINS
General Statistics. B
Foreign Trade: Series A. *Overall Trade by Origin and Destination.* B
Series B. *Analytical Abstracts.* Q
Series C. *Trade by Commodities.* Q
Definition and Methods: Part I. *Industrial Production.* I
Part II. *Population and Manpower, Internal Trade, Prices and Wages, Finance.* I
Part III. *Foreign Trade.* I
Part IV. *Agricultural Production, Agricultural Prices.* I

SPECIAL STATISTICAL ISSUES

Network of intra-European trade. 1959
Foreign trade statistics, 1961–1956: the 'Six'. Two parts 1957
Textiles (imports-exports 1958). 1959
Statistics of exports from overseas territories of the OEEC countries. 1958
Industrial statistics 1900–1959. 1960
Agriculture. Production and consumption figures. 1961
Statistics of national product and expenditure, 1938, 1947–1955. 1957
Manpower statistics. 1961

ECONOMIC SURVEYS

Economic Surveys by the OECD: France. A
Germany, Federal Republic. A
Italy. A
Belgium–Luxembourg Economic Union. A
Netherlands. A

OTHER PUBLICATIONS

Demographic trends in western Europe and in the United States 1956–1976. 1961

International Labour Office

International Labour Office, Geneva.

International Labour Review. Q
Yearbook of Labour Statistics. A
Labour costs in European industry. 1959

European Economic Community

* Statistical Office of the European Communities, 188a avenue de Tervueren, Brussels 15.

Bulletin Général de Statistiques. M
Informations Statistiques. B
Statistiques Industrielles. Q
Statistique Sociale. I
Commerce Extérieur: 1re Série. *Tableaux Synoptiques: Importations et Exportations par Origine et Destination et par Catégories de Produits.* M
2e Série. *Tableaux Analytiques.* A

* Commission of the European Economic Community, Directorate-General for Economic and Financial Affairs, 23 avenue de la Joyeuse Entrée, Brussels.

Economic Situation in the Community. Q
Graphiques et Notes Rapides sur la Conjoncture dans la Communauté. M

* Secretariat of the Commission of the European Economic Community, 23 avenue de la Joyeuse Entrée, Brussels.

General Report of the Activities of the Community. A
Bulletin of the EEC. M
Journal Official des Communautés Européennes. I

* NOTE: Queries on contents should be addressed to the issuing departments as above but publications are all obtainable from the central selling organization—Publishing Services of the European Communities, Bureau de Vente, 2 place de Metz, Luxembourg—as is the Official Gazette which is published jointly by EURATOM, ECSC, and EEC.

COUNTRY STATISTICS

Germany

W. Kohlhammer-Verlag, Stuttgart and Cologne.

Der Aussenhandel der Bundesrepublik Deutschland:

Part 1. *Zusammenfassende Übersichten.* A *and* M

Part 2. *Der Spezialhandel nach Waren mit Angaben für die Herstellungs- und Verbrauchsländer.* A *and* M

Part 3. *Der Aussenhandel nach Bezugs- und Absatzgebieten.* Q

Part 5. *Foreign Trade (special trade) of the Federal Republic of Germany according to the Standard International Trade Classification (SITC).* A *and* M

Part 6. *Direct Transit Trade of the Federal Republic of Germany.* M

Statistisches Jahrbuch für die Bundesrepublik Deutschland. A

Wirtschaft und Statistik. M

Statistischer Wochendienst. W

Die Industrie der Bundesrepublik Deutschland:

Part 1. *Beschäftigung und Umsatz.* M. Employment and turnover

Part 2. *Produktion.* M. Selected products and index

Part 3. *Die Industrielle Produktion.* Q. Industrial production

Part 4. *Sonderveröffentlichungen.* I. Special publications. e.g. Heft 32. Produktion wichtiger Erzeugnisse der verarbeitenden Industrie im Ausland 1950, 1952 bis 1960. Production of processing goods industries abroad.

Internationale Monatszahlen. M

Guide to official German statistics.

Italy

Istituto Centrale di Statistica, via Cesare Balbo 16, Rome.

Bollettino Mensile di Statistica. M

Statistica Mensile del Commercio con l'Estero. M

Annuario Statistico Italiano. A

Compendio Statistico Italiano. A

Statistica Annuale del Commercio con l'Estero. A

Belgium

Institut National de Statistique, 44 rue de Louvain, Brussels.

Annuaire Statistique de la Belgique et du Congo Belge. A

Bulletin de Statistique. M

Bulletin Mensuel du Commerce Extérieur de l'Union Economique Belgo-Luxembourgeoise. M

Institut Belgo-Luxembourgeoise de Change, rue de la Banque, Brussels.

Rapport de l'Institut Belgo-Luxembourgeoise du Change pour l'Année 19.... A

France

Ministère des Finances et des Affaires Economiques.

Obtainable from: L'Imprimerie Nationale SEVPO, 2 rue Paul-Hervieu, Paris 15e.

Le Service National des Statistiques du Commerce Extérieur:
- *Les Commentaires Mensuels des Statistiques du Commerce Extérieur de la France.* M
- *La Situation Trimestrielle des Statistiques du Commerce Extérieur de la France.* Q
- *Le Tableau Général Annuel de la Navigation Maritime.* A

Statistiques du Commerce Extérieur de la France. A *and* M

Annuaire Statistique de la France. A

Division de la Statistique et de la Documentation, 1 place Fontenoy, Paris 7e.
Fascicule Mensuel (Statistique du Travail et de la Sécurité Sociale). M
Revue française du Ministère du Travail (Trimestrielle). Q

Bureau Central de Statistique Industrielle, *à* rue Barbet-de-Jouy, Paris 7e.
Bulletin Mensuel de Statistique Industrielle. M
Annuaire de Statistique Industrielle. A

Direction des Affaires Commerciales, 41 quai Branly, Paris 7e.
Fascicule Mensuel (Enquête Statistique Permanente). M

Bureau de la Statistique Commerciale à la Direction Générale des Douanes et Droits Indirects, Banque des Renseignements Statistiques, 192 rue St. Honoré, Paris 1.
Statistique Trimestrielle du Commerce Extérieur de la France. Q

Bureau de Statistiques et d'Etudes Financières—Palais du Louvre, 93 rue de Rivoli, Paris 1.
Statistiques et Etudes Financières. M (Mensuel avec Supplément)

Netherlands

Central Bureau of Statistics.

Obtainable from: W. de Haan NV, Zeist.

Algemene Tellingen en Bevolkingsstatistiek. A. General census of population.

Sociaal-Economische Statistiek. A. Social and economic statistics.

Statistiek van de Industrie. A. Industrial statistics.
- *Vervaardiging van Aardewerk, Glas, Kalk en Stenen.* Earthenware, glass, quarrying, etc.
- *Grafische Nijverheid, Fotografie.* Printing industry, photographic equipment.
- *Bouwnijverheid.* Building.
- *Chemische Nijverheid.* Chemical industry.
- *Bewerking van Hout, Kurk en Stro.* Wood, cork, and straw processing.
- *Kleding en Reiniging.* Clothing and cleaning.
- *Leder–, Wasdoek–, Rubbernijverheid.* Leather, oilcloth, and rubber industry.
- *Metaalnijverheid, Scheeps–, Vliegtuig– en Wagenbouw.* Metal, shipbuilding, aeroplanes, and wagons.
- *Papiernijverheid.* Paper industry.
- *Textielnijverheid.* Textile industry.
- *Bereiding van Voedings– en Genotmiddelen.* Food, tobacco, etc.

Gerechtelijke Statistiek. A. Judicial statistics.

Nationale Rekeningen. A. National expenditure.

Statistiek van het Financiewezen. A. Financial statistics.

Hendels en Verkeersstatistiek. A *and* M. Trade and transport statistics.

Maandstatistiek van de In–, Uit–, en Doorvoer per Goederensoort. Monthly statistical bulletin of the import, export and transit trade, by commodities.

Culturele Statistiek. A. Cultural statistics.

Landbouwstatistiek. A. Agricultural statistics.

PUBLICATIONS OF OFFICIAL AND NON-OFFICIAL ORGANIZATIONS

GENERAL ECONOMIC SITUATION AND PROSPECTS

Belgium

Institut de Recherches Economiques, Sociales et Politiques, place Mgr Ladeuze, Louvain.

Recherches Economiques de Louvain. 8A

France

Institut National de la Statistique et des Etudes Economiques, quai Branly 29, Paris 7e.

Bulletin Mensuel de Statistique. M
Etudes et Conjoncture. M
Problèmes Economiques (inc. Notes Rapides). W

Bureau de Statistiques et d'Etudes Financières, Ministère des Finances, Paris.

Statistiques et Etudes Financières. M
Suppléments. M

Société d'Etudes et de Documentation Economiques Industrielles et Sociales, bvd St Germain 205, Paris 7e.

Bulletin SEDEIS. 33A

Germany

Statistisches Bundesamt, Gustav–Stresemann–Ring 11, Wiesbaden.

Wirtschaft und Statistik. M

Bundesminister für Wirtschaft, Lengsdorferstrasse, Bonn–Duisdorf.

Die Wirtschaftliche Lage. 16A

Deutsches Institut für Wirtschaftsforschung, Königin–Luise–Strasse 5, Berlin–Dahlem.

Vierteljahrshefte zur Wirtschaftsforschung. B
Wochenberichte. W

IFO–Institut für Wirtschaftsforschung, Poschingerstrasse 5, Munich 27.

Wirtschaftskonjunktur. Q
IFO–Schnelldienst. W
IFO–Schriftenreihe. I

Institut für Weltwirtschaft, Düsternbrooker Weg 120–22, Kiel.

Die Weltwirtschaft. 2A

Hamburgisches Welt–Wirtschafts–Archiv, Poststrasse 11, Hamburg 36.

Wirtschaftsdienst für Auslandsleser. M. English edition available.
Konjunktur von Morgen. 26A

Rheinisch-Westfälisches Institut für Wirtschaftsforschung, Hohenzollernstrasse 1, Essen.
Mitteilungen. M
Konjunkturberichte. Q

Italy

Istituto Nazionale per lo Studio della Congiuntura, via Milano 60-4, Rome.
Congiuntura Italiana. M
Banca Nazionale del Lavoro via Vittorio Veneto 119, Rome.
Italian Trends. 11A. In English.

Luxembourg

Ministère des Affaires Economiques, 9 avenue de la Porte Neuve, Luxembourg.
Bulletin Economique. M
L'Economie Luxembourgeoise. A

Netherlands

Central Bureau voor de Statistiek, The Hague.
Maandschrift. M. English appendix with table headings and notes.
Statistische en Econometrische Onderzoekingen. Q. English summaries.
Statistical Studies. I. Selected translations from Statistische en Econometrische Onderzoekingen.
Nederlandsch Economische Instituut, Pieter de Hoochweg 118, Rotterdam 6.
Ekonomisch-Statistische Berichte. 51A

INDUSTRY AND COMMERCE

Germany

Bundesverband der Deutschen Industrie, Habsburgerring 2-12, Köln 10.
Mitteilungen des Bundesverband der Deutschen Industrie. M
Deutsches Industrie-Institut.
Economic Report from Germany. W. In English.
Unternehmerbrief. W
Schnelldienst. 2W
Rundfunkspiegel. D

NOTE: Deutscher Industrie- und Handelstag, Markt 26/32 Bonn, also issue special publications on such matters as the Common Market and also a very detailed annual report. Many of the regional Industrie- und Handelskammer (which are similar to our Chambers of Commerce) also issue monthly bulletins, similar to our *Board of Trade Journal.*

Gesamtverband der Textilindustrie, Schaumainkai 87, Frankfurt/Main sud.
Die Textilindustrie der Bundesrepublik Deutschland. A

Italy

Istituto Nazionale per il Commercio, Estero.
Informazioni per il Commercio Estero. M
Associazione Industriale Lombarda.
Comparazione dei Salari e del Costo del Lavoro in Europa. A

Associazione fra le Societa Italiane per Azioni.
Rassegna della Stampa. M
Rassegna Economica—Problemi Fiscali. M

Confederazione Generale dell'Industria Italiana.
Notiziario della Confederazione. M. News bulletin of the confederation.
Revista di Politica Economica. M. Review of economic policy.
Rassegna di Statistiche del Lavoro. M. Review of labour statistics.

Istituto Cotoniero Italiana.
Annuario Statistiche Tessili. A
Statistiche Italiane Cotone—Fibre Artificiali. A
Statistiche Tessili. Q

Belgium

Federation de l'Industrie Textile Belge 'Fabeltex', 24 rue Montoyer, Brussels 4.
L'Industrie Textile Belge—Fabeltex. A

Netherlands

Vereniging Katoen–, Rayon– en Linnenindustrie.
Economisch Overzicht. A

France

Jean André, 22 rue St Ferdinand, Paris 17.
Statistique Générale de l'Industrie Textile Française. 2A. Supplement to *Le Mois Textile.*

Syndicat Français des Textiles Artificiels, 55 rue la Boétie, Paris 8e.
Industrie Française des Textiles Artificiels et Synthétiques. A

Société d'Expertise Comptable Fiduciaire de France, 18 rue d'Aguesseau, Paris.
Tableaux comparatifs des charges sociales dans les pays du marché commun. 1960

EUROPEAN MARKET SURVEYS

Contimart AG, International Marketing and Research, Lexhof III, Militärstrasse 90, Zürich.
(UK agent: World's Press News Publishing Co., 9–10 Old Bailey, London EC4).
West German market. 1960
Dutch market. 1959
French market. 1960
Italian market. 1959

Organisation for Economic Co-operation and Development, 2 rue André-Pascal, Paris 16e.
Economic sectors studies

These studies published on individual sectors of the European economy are conducted from different though complementary points of view: some deal with the specific problems of a given sector (e.g. machinery) while others deal with general questions which affect a number of sectors or all sectors (e.g. manpower). The more important studies covering the chemical industry, fertilizers, non-ferrous metals, machinery, timber, pulp and paper, textiles, and hides and skins appear either annually or at two-to three-year intervals.

Agriculture
Food consumption levels in OEEC countries. 1951
Marketing of fruit and vegetables in Europe. 1956
Market for apples and pears in OEEC countries. 1957
Marketing and distribution margins in OEEC countries for livestock and meat. 1959
Fish marketing in OEEC countries. 1952
Fish marketing in Western Europe since 1950. 1957
Consumption of fruit and vegetables in OEEC countries. 1960
Marketing and distribution margins for milk and milk products. 1960

European Productivity Agency reports
Consumer's food-buying habits. 1958
**Market research methods in Europe.* 1956
**Marketing by manufacturers. Report of the International Conference held in Paris, 2nd to 4th May 1956.* 1957
**Market research on a European scale. Report of a further International Conference held in June 1959.* 1960
**Economic performance of self-service in Europe.* 1960
Source of statistics for market research, vol. 1—Radio sets.

McGraw-Hill Publishing Co. Limited, 95 Farringdon Street, London EC4.
West European markets. 1961

Business Publications Limited, London.
Marketing survey of the European Common Market. 1960

This report is the latest and probably the most detailed survey of the European Common Market countries. The six countries are divided into districts and statistical information is tabulated under 34 headings, including data on climate, population, occupations, standards of living, etc. The English edition is priced at £45 approximately.

Board of Trade
Export Service Bulletin Weekly Supplement. W

NOTE: This is issued in three parts: Market Reports, which cover the market for particular products in specific countries; Economic Reports, which analyse the state of the economy in specific countries either annually, quarterly or monthly according to the size of the country; Trade Agreements which give details of agreements between various countries including any alterations in quotas and liberalization measures.

PUBLICATIONS RELATING TO COMMON MARKET ACTIVITIES

Agence Internationale d'Information pour la Presse Luxembourg, 39 rue Notre-Dame, Paris.
Europe: Part 1. *Daily Bulletin.* D
Part 2. *Week in Europe.* W
Part 3. *Documents.* I
Part 4. *Index and Comment.* D

Comtelburo Limited, 85 Fleet Street, London EC4.
Common Market News. W

* NOTE: These reports are valuable for the outline they provide of current developments in market research techniques and practice on the Continent, for the bibliographies of consumer surveys that are given, and for the detail provided of European Market Research Organizations—notably ESOMAR (European Society for Opinion Survey and Market Research).

Business International, 7 rue Versonnex, Geneva.
Business Europe. W

Opera Mundi Europe, 100 avenue Raymond–Poincaré, Paris 16e.
Opera Mundi Europe. W. English edition no longer published but still available from Paris.

Europe Service, 23 rue de Cheroy, Paris 17.
Europe Service. W

Revue du Marché Commun, 3 rue Soufflot, Paris 5.
Revue du Marché Commun. M

Euwid, Schliessfach 77, Berlin W15.
Euwid Europäischer Wirtschaftsdienst. W

ADVERTISING

McCallum Advertising Limited, 20 Coates Crescent, Edinburgh.
The Common Market.

W. S. Crawford Limited, 233 High Holborn, London WC1.
Survey of the Common Market.

International Advertising & Marketing Limited (INTAM), 399–401 Strand, London WC2.
Mass media audiences in the European Economic Community.

International Advertising Association, New York.
International Advertiser. M

NOTE: In particular see August 1961 for article on the advertising expenditure by media by major countries.

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Elvinger Advertising Agency, 78 avenue Marceau, Paris.
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Les formes nouvelles de la distribution dans l'alimentation.

Correspondance de la Publicité, 13 avenue de l'Opera, Paris.
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Régie–Presse Division Internationale, 133 Champs Elysées, Paris.
Régie.

Centre d'Etude des Supports de Publicité, 27 bis avenue de Villiers, Paris 17e.
Etude sur les Lecteurs de la Presse. A

Germany

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Gee Advertising Limited, 23 Great Castle Street, London W1.
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Italy

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Pubbli-market, via Morigi 11, Milan.
How many Italians eat spaghetti?
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Benelux

ADMARCO, 2 place de l'Albertine, Brussels.
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Belgium

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La Revue de la Banque, 8 rue du Moniteur, Brussels.
La Revue de la Banque. M
Banque Nationale de Belgique, Brussels.
Bulletin d'Information et Documentation. M
Banque de Bruxelles S.A., Brussels.
Economic Research Department Bulletin. I

Germany

Deutsche Bundesbank, Taunusanlage 4–6, Frankfurt/Main.
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Berliner Bank, Hardenbergstrasse 32, Berlin–Charlottenburg 2.
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France

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Italy

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Netherlands
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TARIFF AND TAX INFORMATION

Creative Journals Limited, Canberra House, 85/87 Jermyn Street, London SW1.
Eurotariff Service. A. and amendments

Benelux
Editorial Office, 9 rue St Bernard, Brussels.
Tarif des Droits d'Entrée. A
Institut Belgo–Luxembourgeoise du Change, rue de la Banque, Brussels.
Réglementation du change en Union Economique Belgo–Luxembourgeoise.
International Bureau of Fiscal Documentation, Herengracht 196, Amsterdam C.
European Taxation. M
Editorial Office, 9 rue St Bernard, Brussels.
Nomenclature Douanière des Marchandises. A
Notes Explicatives du Tarif des Droits d'Entrée. A

Germany
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Deutscher Gebrauchs–zolltarif. A
Erläuterungen zum Deutschen Zolltarif. A
C. H. Beck'sche Verlagsbuchhandlung, Munich.
Deutsche Steuergesetze einschliesslich Ausfuhrförderungsgesetz. A

Italy
Ministero della Finanze Direzione Generale delle Dogane e Imposte Indirette, Ufficio Technico Centrale delle Dogane, Rome.
Tariffa dei Dazi Dogamali di Importazione della Repubblica Italiana. A
Confederazione Generale Italiana del Commercio, Piazza G.G. Belli n.2, Rome.
Manuale d'Uso della Tariffa Doganale dei Dazi di Importazione. A
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Informazioni per il Commercio Estero. M

France
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Memento pratique du contribuable 1961. Condensé de tous les impots (Impots directs. Taxes sur le Chiffre d'affaires. Principaux droits indirects et droits d'enregistrement). Grandes questions de sécurité sociale et de legislation du travail à jour au 15 avril 1961.

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Belgium

Emile Bruylant, rue de la Régence 67, Brussels.
Recueil financier. A

France

S. A. Côte Desfossés, 42 rue Notre Dame des Victoires, Paris 2.
Annuaire Desfossés. A

Germany

Verlag Hoppenstedt, Darmstadt.
Handbuch der Deutschen Aktiengesellschaften. A
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Deutsche Kunststoffe. A
ABC der Deutschen Wirtschaft, Darmstadt.
ABC der Deutschen Wirtschaft. A
ABC der Deutschen Wirtschaft Industrieller Informationsdienst: Adresse und Auskunft. Band 3. A
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Italy

Associazione fra le Società Ital. per azioni, via Cesare Battisti 121, Rome.
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Luxembourg

Banque Internationale de Luxembourg, Luxembourg.
Annuaire des Sociétés Anonymes de Luxembourg. A

Netherlands

H. P. Leopolds UMNV, Noordeinde 23, The Hague.
van Oss Effectenboek. A

LEADING FINANCIAL NEWSPAPERS

Germany

Frankfurter Allgemeine Zeitung. D
Handelsblatt. D
Industriekurier. D
Sueddeutsche Zeitung. D
Die Welt. D

Italy

Il Globo. D
24 Ore. D
Il Sole. D
Mondo Economico. W

France

La Côte Desfossés. D
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Les Informations. D
Le Monde. D
Le Parisien Libéré. D
Fortune Française. W
La Vie Française. W

Belgium

Agence Economique. D
La Côte Libre. D
Echo de la Bourse. D

Netherlands

Algemeen Handelsblad. D
Het Financieele Dagblad. D
Elseviers Weekblad. W
Financieele Economische Berichten. W
De Financieele Koerier. W

Letters to the Editor

PUNCHED CARDS

We are informed by the Institute of Petroleum that 'The Technologist and his Information Facilities' by R. Snel, quoted on page 128 of this volume in a letter from P. D. J. Rae, was published in the May 1962 issue of the *Institute of Petroleum Journal* not in the April issue as quoted.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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MEMBERS' ADVERTISEMENTS

The charge for advertisements in these columns is *4d* per word, minimum *5s*. An additional charge of *6d* is made for the use of a box number.

TRANSLATIONS into/from Dutch, from German and French. Also scanning/abstracting Common Market publications. Speller-Kuijpers, FIL, NGV, 5 Stratton Close, Hounslow, Middlesex. Hounslow 6954.

TRANSLATIONS; TECHNICAL, SCIENTIFIC, all languages, by specialists with sound technical and scientific qualifications. J. Smuts, BSC(ENG.), FIL, 12 Thorndene Avenue, London N11. Stamford Hill 8564.

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Appointments vacant

ASSISTANT in the TECHNICAL INFORMATION SERVICE required by the Central Electricity Generating Board for their headquarters offices in London SE1. The main functions of this service are abstracting from current technical literature, preparation of bibliographies, answering technical inquiries for published information, technical translating. The duties of this appointment include the appraisal of articles for translation, some translating, editing of translations prepared by outside translators, searching and abstracting from foreign literature. Applicants should have experience in technical information work and adequate technical linguistic knowledge, preferably including a knowledge of German, to enable them to assess broadly the relative values of technical information. A knowledge of the electricity supply industry would be advantageous. The salary will be within the range £1,200–£1,290 p.a. Applications stating age, qualifications, experience, present position, should be forwarded to the Appointments Officer, 24–30 Holborn, London EC1. Quote Ref. AS/56A.

ASSISTANT INFORMATION SCIENTIST (age not over 35 years) required at research department in country surroundings close to London. Degree (preferably in chemistry), good French and/or German reading ability. Previous experience an advantage. Five-day week. Non-contributory pension and profit-sharing schemes. Canteen facilities. Salary according to age and experience. Apply to Director of Research, TATE & LYLE REFINERIES LTD, 'Ravensbourne', Westerham Road, Keston, Kent.

IBM UNITED KINGDOM LIMITED requires an ASSISTANT PROGRAM LIBRARIAN for its library of computer programs and programming literature, specializing in the information concerning data processing and its applications. The assistant will help with the work of receiving, cataloguing, reproducing, and distributing programming material, but will also answer queries and participate in the general work of the library. Applicants should be about 20–25 years old and should preferably have passed the Library Association First Professional Examination. Please write to the Manager of Personnel Selection, 101 Wigmore Street, London W1, quoting ref. GA/AS/99.

AN INFORMATION OFFICER/LIBRARIAN is required for the London headquarters of W. R. Grace & Co. of New York, to set up and operate a central information department. At least five years experience in a similar post, in industry, is required. Technical and/or economics qualifications desirable, and a knowledge of any European languages would be an advantage. The responsibilities carried by this new appointment will match the rapidly expanding range of the Company's activities in Europe. Commencing salary according to experience and qualifications but not less than £950 p.a. Apply in confidence stating age, qualifications, and experience to Staff Manager, GRACE BROTHERS LTD, Glen House, Stag Place, London SW1.

LIBRARIAN. The ASSOCIATED OCTEL COMPANY LIMITED (formerly the Associated Ethyl Company Limited) requires a Librarian for the technical library in its Engine Laboratory at Bletchley, Bucks. The person appointed will be responsible for running a small library under the direction of the Information Officer. The duties will include a lending service, preparing catalogues, indexing, and answering inquiries. The post may particularly appeal to someone anxious to develop a career in technical library and information work. Candidates, preferably aged 20–25 years, must have at least two subjects in the General Certificate of Education at A level, and previous training in librarianship would be an advantage. The Laboratories, situated in pleasant rural surroundings, are modern and well equipped. There is a company pension scheme. Applications quoting ref. AP 195 should be addressed to Manager, Staff & Training Department, The Associated Octel Company Limited, Ellesmere Port, Cheshire.

LIBRARIANS (GRADE IV) in GOVERNMENT DEPARTMENTS. Six pensionable posts for men or women at least 22 on 1st June 1962, in *a*, Ministry of Agriculture, Fisheries, and Food, London; *b*, Royal Aircraft Establishment, Farnborough, Hants; *c*, Joint Intelligence Bureau, London; *d*, Government Communications Headquarters, Cheltenham; *e*, Ministry of Health, London; *f*, Safety in Mines Research Establishment, Buxton. Candidates must have passed the Registration Examination of the Library Association, or hold London University Diploma in Librarianship. In addition, for post *a*, knowledge of a scientific library an advantage. For post *b*, interest in scientific and technical matters and in film techniques desirable. Post *c* requires knowledge of resources of London libraries and acquaintance with at least two modern foreign languages. For post *d*, knowledge of one or more foreign languages and experience in the field of telecommunications and electronics desirable. For post *e*, good reading knowledge of at least two modern European languages essential (Dutch, German, and Scandinavian languages particularly useful). For post *f*, technical library experience normally required, but relevant scientific or technical qualifications may be accepted in lieu. Starting salary (inner London) £700 at age 22 to £819 (or, exceptionally, higher) at 25 or over. Scale maximum £1,214. Promotion prospects. Write to Civil Service Commission, Burlington Gardens, London W1 for application form *quoting* 5500/62. Closing date 25th June 1962.

TECHNICAL TRANSLATOR required for translation especially from German into English for electrical/mechanical manufacturers in Acton. Free lance applicants not considered. English mother tongue and experience in technical writing necessary. Apply, giving full details, to the Secretary, Landis & Gyr Ltd, Victoria Road, North Acton, London W3.

THE BRITISH PETROLEUM COMPANY LIMITED has a vacancy for a TECHNICAL INFORMATION OFFICER (female) at its head office in London. Applicants should be under 35 and preferably have a science degree. Previous experience in a technical information service or a technical library is desirable but not essential. Duties will include supplying information in response to specific inquiries, preparation of routine technical bulletins, indexes, abstracts, and reviews. Five-day week, luncheon club with 1*s* lunches, non-contributory pension scheme, holiday arrangements recognized, excellent sports and social facilities. Applicants should write stating age, qualifications, and experience, giving dates on which available if required for interview, quoting HF15, to Box 4586, c/o Hanway House, Clark's Place, London EC2.

THE E S & A ROBINSON GROUP have a vacancy for a TECHNICAL INFORMATION OFFICER at the Group Central Laboratories on the outskirts of Bristol. These laboratories serve the whole Robinson Group, which comprises over thirty companies in the UK and abroad, and is one of the largest organizations in the Commonwealth engaged in the manufacture of packaging materials. The department is at present small, but it is hoped to appoint a man of high potential who can develop its work. Applicants should be graduate scientists, preferably in chemistry or physics, and in the age range 21 to 35. Relevant experience would be useful. It is essential that the successful applicant should be able to take up the appointment within the next month or two. Application should be made, with a brief statement of relevant particulars, and quoting reference AM, to the Staff Manager, E S & A Robinson (Holdings) Ltd, Bristol 1.

TWO RESEARCH ASSISTANTS are required for a period of two years to take part in the continuation of the Aslib Cranfield investigation into the efficiency of indexing systems, under a further grant from the National Science Foundation. The Director will be Mr C. W. Cleverdon and the full-time Deputy-Director will be Mr J. Mills. Applicants for the senior post, which will be located in London, should have experience in librarianship with some knowledge of engineering, physics, or mathematics or should have graduated in one of these subjects. Applicants for the junior post, which will be located at the College of Aeronautics, Cranfield, should have passed the Registration examination of the Library Association; experience in a special library would be an advantage. Salaries will depend on experience and qualifications, but will be not less than £1,450 p.a. for the senior post and £900 p.a. for the junior post. Written applications to The Director, Aslib, 3 Belgrave Square, London SW1.

LIBRARY ASSISTANT, either sex, required for technical library serving rubber industry. Duties include reference work, cataloguing, control of reports and periodicals. Applicants should have either Group A or two of Groups B to D of the LA Registration examination, though applicants with three GCE subjects at A level and experience in a technical library considered. The position is on Assistant Technical Officer grade with prospects of promotion to higher grades depending on further qualifications and service. Salary in the range £460–£760, starting point depending on age and qualifications. Applications to the Secretary, RUBBER AND PLASTICS RESEARCH ASSOCIATION of Great Britain, Shawbury, Shrewsbury, Shropshire.

For disposal

British Coal Utilisation Research Association Bulletin, 1958–60; *British Journal of Applied Physics*, 1959–60; *Chartered Mechanical Engineer*, 1954–59; *Control Engineering*, 1958–60; *Electrical Engineering Abstracts*, 1959–60; *Electronic Engineering*, 1956–59; *Engineering Materials and Design*, 1959–60; *Home Appliance Builder*, 1959–60; *Instrument & Control Systems,* 1952–59; *Instrument Practice,* 1955–59; *Instruments & Automation,* 1958–59; *Journal Applied Physics* (American), 1958–60; *Journal of Electronics & Control,* 1958–60; *Monthly Digest of Statistics,* 1956–60; *NRDC Bulletin,* 1958–60; *Optics & Spectroscopy,* 1959–60; *Physics Abstracts,* 1958–60; *Process Control & Automation,* 1959–60; *Review of Scientific Intruments,* 1958–59; *Sira Reviews,* 1955–60; *Society of Instrument Technology,* 1951–59; *Vaccuum,* 1956–60 and some issues 1952–55. Apply to Librarian, Drayton Controls Ltd, Horton Road Works, West Drayton, Middlesex.

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Applicants should be in the age range 22–27, may be either male or female, and will probably possess a degree to do with commerce, or Part A of the A.L.A. examination. Experience in the handling of information, or of the food industry, would obviously be advantageous, but in the main what we seek is an inquiring mind allied to a fresh and alert intelligence.

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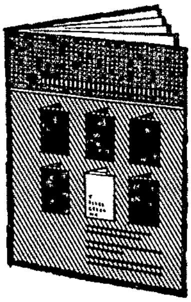

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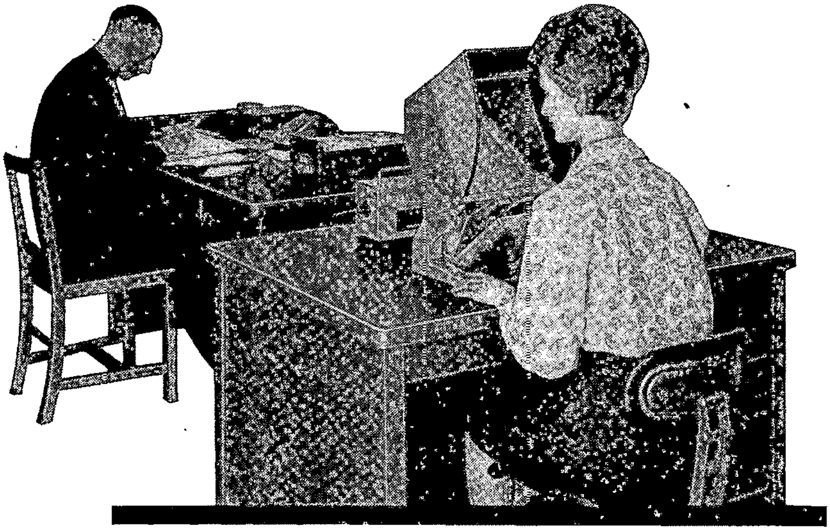

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CONFERENCE ON THE COMMON MARKET
implications for information services

British Government Services for Exporters
HARRY BIRTLES

Panel Discussion

Making Communication Links Effective
C. J. ARLIDGE

Standards Questions
BRITISH STANDARDS INSTITUTION

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Aslib Proc. vol.14 no.7 pp.181-213 London, July 1962

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 July 1962 Number 7

ASLIB CALENDAR

1962

September

WED.19. Electronics Group visit to Royal Radar Establishment.
THUR.20. Technical Translation Group meeting at Aslib.

October

TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.

November

THUR.8. Technical Translation Group sherry party at Aslib.
FRI.16. Northern Branch conference in Bradford.

December

THUR.6. Technical Translation Group meeting at Aslib.

1963

June

FRI.14 – SUN.16. Electronics Group annual conference at Ashridge College.

Publications Officer

We very much regret to announce the resignation from the Aslib staff of Miss Jean Leslie, our Publications Officer since September 1956. Miss Leslie takes with her the best wishes of the membership to her new appointment as Publications Manager of the Embroiderers' Guild.

She is being succeeded at Aslib by Miss Alison Clarke, M.A., F.L.A., Librarian and Editorial Assistant of the National Institute of Economic and Social Research.

Electronics Group

The fourth annual conference was held at Ashridge College from 1st to 3rd June, and was attended by sixty-five delegates—a record. The Annual General Meeting was held during the conference and the following officers and committee were elected for 1962–63: Chairman, Mr N. E. C. Isotta; Hon. Treasurer, Mr J. E. Bolton-Allen; Hon. Secretary, Miss B. Newman, Ericsson Telephones Ltd, Beeston, Nottingham; Conference Secretary, Mr R. S. Lawrie; *Newsletter* Editor, Mrs E. M. Codlin; members: Mr T. M. Aitchison, Mr J. D. Black, Mr P. J. H. Massingham, Mr C. K. Moore, Mr K. J. Spencer, Mr J. E. Wright.

The next annual conference will be held from 14th to 16th June 1963, again at Ashridge College.

A visit to the Royal Radar Establishment, Malvern, will take place on 19th September; details have been circulated to Group members.

Engineering Group

The Annual General Meeting was held at Aslib on 24th May 1962. Eighteen members attended. The minutes of the 1961 Annual General Meeting, Chairman's report, and Treasurer's report were adopted and the following officers and committee members were elected: Chairman, F. H. Smith, Royal Aeronautical Society; Vice-Chairman, J. G. Hall, Esso Research Ltd; Hon. Treasurer, Miss M. Surry, Ferranti Limited; Hon. Secretary, D. E. Clarke, CAV Limited, Larden Road, Acton, London W3. Committee: Mrs E. M. Marsland, Miss F. M. Bruce, Miss M. L. South, Miss E. I. Shanks, Mr H. W. Gatehouse, Mr R. H. Sorrell, and Mr W. J. Course.

The following motion was passed and will come into effect at the next Annual General Meeting: 'The Chairman shall not hold office for more than two consecutive years, and Committee Members shall not sit for more than six consecutive years'. This should ensure the election of new committee members at more frequent intervals than hitherto. It was decided to continue negotiations with the Aeronautical Group on the subject of a joint annual conference, and a note will be sent to all members in order to get some idea of the number of people likely to attend.

Society of Indexers

At the fifth Annual General Meeting of the Society of Indexers, held on 19th May, the following officers were elected: President, Mr G. V. Carey; Vice-Presidents, Mr A. R. Hewitt and Mr J. C. Thornton; Chairman, Mr G. Norman Knight; Vice-Chairman, Mr R. Bancroft; Treasurer, Mr R. L. Collison; Membership Secretary, Mr T. A. Miller; General Secretary, Mr E. Alan Baker, 3 Twyford Crescent, London W3.

Royal National Institute for the Deaf: Library

The use of the library of the Royal National Institute for the Deaf, at 105 Gower Street, London WC1, for study and research has increased considerably during the past two years and the Council of the institute has now provided a small reading room in the institute, where users may consult library material undisturbed. The reading room has now been in use for more than two months. In addition, the Institute Librarian, Dr Pierre Gorman, is willing to open the library in the evening or on Saturdays if specially requested.

Sheffield Postgraduate School of Librarianship

The Sheffield Town Trustees have made a grant of £2,000 a year for five years to the University of Sheffield to help with the cost of establishing a postgraduate school of librarianship. It is understood that the university already owns a large house which will be converted to accommodate the new school and that the Trustees' grant will implement the appointment of a Director of the Postgraduate School of Librarianship, to be made immediately. The university intends to grant its own Diploma in Librarianship and the syllabus will lay special emphasis on training in scientific and technical librarianship.

Technical Authorship and Illustration Courses

Details have been received of City & Guilds courses in technical authorship at the following colleges.

Willesden Technical College. Technical Authorship (course 229), a three-year evening course in two parts to be held on Monday and Thursday evenings from 7 to 9.30 p.m. This college has also attempted to run courses of special lectures on the passage of technical information and on its collection and recovery, but has been narrowly defeated by lack of students.

East Ham Technical College. Technical Illustration (course 228). A combined first-year course in technical illustration and commercial art is offered, followed by a separate second-year course to first-year City & Guilds standard. This leads to the Intermediate 228 examination.

Hatfield College of Technology. Technical Authorship (course 229) for the Ordinary Certificate will be provided, starting in September, consisting of one afternoon and one evening per week.

Further details are available from the respective colleges.

Standing Conference on Library Materials on Africa

Because it was felt that documentary materials for the study of modern Africa in all its aspects were inadequately provided by libraries in the United Kingdom, the Standing Conference on Library Materials on Africa was recently set up.

The aims of the Conference are: *i*, to facilitate the acquisition and preservation of library materials needed for African studies; and *ii*, to assist in the recording and use of such materials. A programme has already been approved and preliminary work is being done on some of the projects. The Chairman is Mr J. D. Pearson, Librarian of the School of Oriental and African Studies, University of London, and the Secretary is Miss Dorothy Hamerton, Librarian of the Royal Institute of International Affairs, London, to whom all inquiries should be addressed. Representatives of the Colonial Office; the Institute of Commonwealth Studies, London; the Royal Commonwealth Society; Rhodes House, Oxford; the BBC; and the London School of Economics are also on the Committee. Full membership is open to institutions in the United Kingdom actively acquiring library materials on Africa and co-operating in the schemes promoted by the Conference. Supporting membership is open to other bodies interested in the aims of the organization. The annual subscription is a minimum of 3 guineas.

Microdoc

The Council for Microphotography and Document Reproduction was inaugurated in February 1962. One of its first acts has been to commence publication of the journal *Microdoc,* edited by Mark Patterson, B.A., A.L.C.M. The aim of the journal is to keep members of the Council 'abreast of progress and events', as well as to be a 'forum for the research article, the review, the query, and the complaint'. It is available from the Council, Chaucer House, Malet Place, London WC1, at 30*s* per annum to non-members of the Council.

International Library of Science, Technology, and Engineering

On 23rd May, Pergamon Press celebrated, with a reception at its Oxford headquarters, the official launching of a new Commonwealth and International Library of Science, Technology, and Engineering, to be published between 1962 and 1967. Approximately one thousand textbooks and monographs are envisaged in a soft-cover edition within the price range 7*s* 6*d* to 17*s* 6*d*, and in a more expensive hard-cover edition for library use. They will all be specially written for the series and will provide for all groups from eleven plus to graduate level; some monographs for the postgraduate student and research worker are also intended. The first fifty titles should be published this year. There is to be a 'Library and Technical Information' division with Dr G. Chandler, City Librarian of Liverpool, as Editor.

Guide to Microreproduction Equipment

The National Microfilm Association (NMA) has issued a completely revised expanded second edition of the basic handbook, the *Guide to microreproduction equipment* edited by Hubbard W. Ballou of Columbia University. The *Guide* was first published by NMA in 1959 with the aid of a grant from the Council on Library Resources; it provides illustrated factual data including prices of all known microreproduction equipment produced or sold in the United States. The second edition brings this information up to date, eliminates obsolete or discontinued items, and extends the coverage to new areas including high-capacity data storage and retrieval, data management, and the like. Continuations, to maintain coverage up to date, appear in *National Micro News,* the bi-monthly journal of NMA. The *Guide* is available, price $10 ($7.50 to members of NMA) from National Microfilm Association, PO Box 386, Annapolis, Maryland, USA.

Library Association Annual Conference

The annual conference of the Library Association will be held this year at Llandudno from 24th to 28th September. Applications from members of the Association wishing to attend must be received by the Secretary, the Library Association, Chaucer House, Malet Place, London WC1 not later than 28th July.

Publications on the Common Market

HM Stationery Office has announced that it now holds stocks of the English translation of the *Treaty establishing the European Economic Community* which it recently published at 10*s*. Another HMSO publication of interest is *Britain and the European Communities*, prepared by the Information Division of the Treasury and the Central Office of Information, and available at 3*s*. This provides the factual background to Britain's application for membership, giving essential information about the three Communities and a detailed picture of the European economy as a whole. These publications may be obtained from any government bookshop.

Readers are reminded that HMSO is the agent in the United Kingdom for publications of the United Nations and its subsidiary organizations and for those of the Organization for Economic Co-operation and Development and the European Economic Community. Orders for these publications should be sent to HMSO, Box 569, London SE1.

Standard on Plastics Abbreviations

The British Standards Institution points out that *List of common names and abbreviations for plastics* has been published as BS 3502 : 1962, not BS 3802 as stated last month on page 141 of this volume.

CONFERENCE ON THE COMMON MARKET

Implications for Information Services

London, 22nd March 1962

BRITISH GOVERNMENT SERVICES FOR EXPORTERS

HARRY BIRTLES, C.B.E.
Head of Export Services Branch, Board of Trade

BOARD OF TRADE

For a trader in need of any sort of information or advice which may help him to sell goods overseas, the point of contact is the nearest regional office of the Board of Trade. There are nine of them throughout Great Britain and a similar service is provided by the Ministry of Commerce in Northern Ireland. If it is more convenient to do so, contact can be made direct with the Export Services Branch of the Board of Trade in London. There need be no hesitancy about approaching any Board of Trade office. The Board will be only too glad to hear from traders or, better still, to meet them personally. The size of the problem does not matter.

The Board of Trade can provide answers from information which it has already on record to most of the questions and problems which beset any exporter, but should the information needed not be available immediately it can be obtained quickly from one or more of over two hundred Foreign Service Commercial Officers at our Embassies and Consulates in most foreign countries or from our Trade Commissioners in Commonwealth countries.

Information

The following are details of the sort of information the Board can provide.

Firstly, it can advise about the export possibilities for products, how to set about establishing those products in overseas markets as well as identifying the most likely countries where a market may exist. The Board has much information about the market prospects, business conditions, local production and imports, local tastes and peculiarities, trading methods, other foreign competition, about most commodities and industries in most countries. It has a comprehensive collection of foreign trade directories, lists of importers and a unique selection of foreign firms' catalogues and pamphlets gathered in many countries overseas.

The Board of Trade can provide precise and up-to-date information about the tariff and import regulations of overseas countries which affect the import into them of British goods. Not only can it give details of Customs duties, import licensing, and quota arrangements where they exist, but also details of the regulations to be complied with about such things as Certificates of Origin, Consular invoices and fees, food and drug regulations, trade and merchandise marks, import of samples, and so on. Through the overseas posts the Board can give firms the names and addresses of translators able to turn sales and technical literature into the local language.

For any British manufacturer looking for new markets one of the biggest problems is always how to establish connections with really good agents or representatives in the countries in which he is going to sell. The Board of Trade can do a good deal to help with this particularly difficult problem. Initially it will compile, with help from the manufacturer, a carefully prepared statement about the product and requirements. Armed with this statement it will consult the Commercial Officer or Trade Commissioner in the country where it is intended to sell. The Commercial Officer or Trade Commissioner, who has a wide field of contacts in his territory, will make suggestions about likely individuals, based on his personal knowledge and experience, after having approached them personally to establish their willingness to consider undertaking the proposed agency or representation. It is not a question of just taking names off a list or card index because experience indicates that satisfactory connections are seldom established in this manner. Usually the Commercial Officer or Trade Commissioner will be able to suggest two or three carefully selected nominees for an agency.

The decision about making an appointment naturally rests entirely with the United Kingdom exporter and the Board of Trade actually takes no part in this. But it does sincerely recommend that whenever practicable a visit should be made to the country to see the nominees personally before commitment is made.

Nothing can really replace personal contact by the British exporter with his market overseas. The Board is therefore anxious and willing to do all it can to help him when on visits abroad. If exporters let the Board of Trade know when they intend to go abroad the Board can provide background material as well as advice about itineraries. At the same time the Board will advise its Commercial Officers or Trade Commissioners at the places where the visits are being made. Properly briefed, Commercial Officers and Trade Commissioners can take much preliminary work off exporters' shoulders by making arrangements for the introductions which are needed and collecting preliminary information against arrival.

The Export Services Branch of the Board of Trade maintains records of commercial status information about overseas firms, and this is available to British exporters for the asking. Provided that they are not the subject of legal proceedings the Board will do all it can to help in the settlement of commercial disputes which inevitably arise occasionally between firms here and overseas and, if unsuccessful, it is always prepared to provide the names of lawyers or consultants abroad when expert help is required. It will within reason obtain from abroad small samples of overseas manufactured goods which may be needed to test the strength of foreign competition. For the most part all these services are available without charge to all British traders who care to use them. If the answer to a particular problem or question is not known, usually it can be found or the way to go about finding it established.

Export Service Bulletin

This is a publication which, for a small annual subscription, provides a comprehensive service of detailed information. It provides highly detailed up-to-the-minute information about export opportunities overseas, such as foreign buyers seeking British sources of supply for particular goods, and overseas agents looking for British principals with a view to introducing British goods into their markets. There is a continual stream of detailed particulars about contracts put out to tender by overseas governments, municipalities, and similar bodies, as well as advance information about openings abroad in connection with public utility works such as new public buildings, power stations, bridges, hospitals, hotels, and so on.

In addition, the *Export Service Bulletin* provides a regular service of economic reports giving general appreciations of current commercial and economic conditions in most countries overseas, and more detailed market reports about the prospects for the sale of particular United Kingdom manufactures in individual countries. The Board is always happy to send firms specimen copies and more information about the Bulletin.

GOVERNMENT INFORMATION SERVICES

In nearly every country abroad there is a British Information Officer. He is fed from London with news items, articles, photographs, films, and reference material, and it is his job to persuade local editors, broadcasters, and other makers of local opinion to present Britain in a good light. He is not concerned with trade alone, but the presentation of this country's industrial achievements and its ability to deliver the goods is an important part of his job. Firms with a story or a picture which might appeal to an editor abroad should get in touch either with the Central Office of Information (COI) or with the Export Publicity and Fairs Branch, Board of Trade.

Businessmen going on visits abroad who think that the local British Information Officer might help them to get publicity on the spot should also get in touch with the COI or the Board of Trade. Firms contemplating making a film who think it might help with the selling job abroad are advised to consult the COI or the Board, before they start, for advice about techniques and technicalities. The COI is glad to provide a folder and a set of leaflets describing these facilities in more detail.

BRITISH 'WEEKS' ABROAD

A relatively inexpensive way of showing our goods abroad is provided by some of the increasing number of British Weeks organized in towns (generally provincial centres rather than capital cities) in various countries overseas. Basically the idea is to offer people a cross-section of British life and the emphasis is usually on cultural and social matters, but it is often possible to arrange associated shop-window displays, exhibits, and demonstrations in department stores, as well as attractions such as fashion shows or a cavalcade of British motor cars.

Generally speaking, this is a less expensive proposition for a firm than taking part in a trade fair and it can create a lot of local goodwill. In many countries, apart from the capital city there is astonishingly little understanding of what Britain has to offer. 'Approved' proposals for British Weeks abroad are considered by the Board of Trade and the Federation of British Industries, and further details can be obtained from either.

EXPORT CREDITS GUARANTEE DEPARTMENT

In making passing reference to the Export Credits Guarantee Department, without which no discussion of the Government Services for Exporters would be complete, I have no intention of going into detail. Suffice it to say that a credit insurance for exporters is a subject in its own right and should be dealt with as such by an expert. The Department exists to provide credit insurance for British exporters and merchants against the major financial risks incurred in overseas trading, including the insolvency or protracted default of the overseas buyer and action by foreign Governments which may prevent or delay transfer of payments in sterling to the British exporter. Other contingencies which can be provided for include the imposition of new import licensing restrictions in the buyer's country or the cancellation of import licence, war risks, cancellation or non-renewal of a British export licence, civil war in the buyer's country, and so on. There are many forms of guarantee applying to traders' varying circumstances and the differing backgrounds of overseas markets, and no British exporter who takes his export business seriously can afford to dispense with the protection which Export Credits Guarantee Department can provide.

DISCUSSION

The Chairman said that he had been fascinated, as no doubt many of them had, by some of the aspects of Mr Birtles' description of his Department's activities. It was quite evident that the Board of Trade depended for much of their information and the service they provided on their commercial officers and trade commissioners abroad, and he thought it was true to say that the function of the embassy, as this country had seen it, had been diplomacy rather than trade. The smaller powers had been able to look at it the other way round and had benefited accordingly. Their embassies had been primarily for the purpose of trade. In fact, the proliferation of ambassadors was evidence of this—especially in Africa with its newly independent countries—so that up to a point the provision of these services by this country became perhaps secondary to diplomacy, to its disadvantage.

There was one matter which Mr Birtles could not raise. When seeking information on export opportunities and, indeed, on quite a range of factual matters which ran parallel with and in fact overlapped with those of the Board of Trade, he had himself found the United States Department of Commerce *Foreign Commerce Weekly* very useful in giving information on exports, and a great deal of factual information. It also gave surveys of countries. It was not very cheap but it was very useful.

Mr M. J. W. Mooney (Market Research Executive, R. B. Pullin & Co. Ltd) did not think Mr Birtles had played fair in not dealing with Mr Ross's comments. He felt that a lot more could be done about the training of the clerical and supervisory grades in the Board of Trade. Compared with the United States Information Service there was much to be desired. He felt sure that many would agree with him that there was now a great opportunity for the Board of Trade really to help people to export.

Mr Birtles, in reply, said that he did not think the Board of Trade was any different from any other major organization; it was merely that a Government department perhaps was a slightly better target!

So far as training was concerned, he agreed entirely with what the last questioner said. They were not quite so stupid as they looked, for the Board of Trade paid out quite a lot of money each year so that junior staff could take training courses. There was an excellent one run at the

City of London College, for example, which many of the junior staff had attended. The ladies, good friends of his on the ground floor room of Lacon House, to whom reference had been made, were so to speak staffing an inquiry room which covered half a dozen other departments in the Board of Trade. It was not really the place in which to seek detailed information; they were merely there, as it were, to open doors for people, and if they had not opened them satisfactorily in the past he was sure they would try very much harder next time.

Obviously, like any other organization, the Board of Trade was not foolproof. He could not accept the comment made in regard to his good friends in the US Department of Commerce. The Board of Trade had been in the business now for a good many years, in fact over half a century. Some might well say that they looked like it, but that would not be particularly relevant. The fact was that, on a world-wide basis, there was little difference between the service they provided and that provided by the United States Department of Commerce, except in some particular background. The US Department of Commerce market service reports were done on a rather different basis from those of the Board of Trade. Some people liked them one way and some the other. On the whole the Board of Trade tried to provide what the industry asked for collectively; they could not meet each individual firm's views or requirements. If people were not getting what they asked for, the best thing for them to do was to shout and say so in a loud and clear voice, stating precisely what it was that the Board was not providing and why they thought the Board ought to provide it. Anything of that sort would always get the most serious attention, provided it did not involve the expenditure of very substantial sums of Government money in one particular direction which would not necessarily be of value generally. This question of money had to be given careful thought. Although the Government spent more money on the provision of export services than any other individual government in Europe it was still a fact that not everything could be done. It was necessary to be sensible about the amount of money spent. If anyone felt that industry was not being supported sufficiently the best thing was not to suffer in silence and wait for opportunities like this but to say so to the Board, who would be only too glad to do what it could about it, though this was not a promise that they could always necessarily meet specialized individual requirements.

Mr J. J. Eyre (Assistant Information Officer, Powell Duffryn Limited) said that whenever he had occasion to telephone the Board on the Common Market they were most helpful, but unfortunately there was no one department dealing with the Common Market; one had to go to the German part and the Italian part and so on. Was there any hope of their being joined together in one eventually or would they always be separated?

Mr Birtles said that so far as detailed information about negotiations, tariff background, and so on was concerned, it was undoubtedly going to be dealt with under the headings of the separate countries for the time being. The present fluid state would be complicated to deal with otherwise because the daily requirements were related to the actualities of the moment and might not be related to the sort of inquiries with which someone was immediately concerned. Should Britain accede to the Treaty of Rome it might be practicable and necessary to make collective arrangements; in fact, he strongly supported the speaker's view that this would be essential, but for the day-to-day commitments at the moment it could not be done without cutting off the service from a large field of people who were still not so much concerned with the developments of the Common Market; it could not be taken away from a country-to-country background.

The Chairman thought it was evident from what Dr Pryce said that until Britain was in the Common Market and something was done about translation and language it was the predigesting of material from the communities which was the information officer's leading problem, i.e. getting it into English or getting it in English eventually. One of the more interesting points raised by Mr Ross in his excellent and interesting talk was this question of the need to have a service which was analogous to that run by the Germans in Hamburg. This was a need which he had often heard expressed and which he felt himself. It was also very interesting that Mr Ross had described the functions and information available by personal approach to the various continental trade associations.

Lastly, with regard to the particular problems of Mr Birtles and his department, and the services which it offered to information officers, the moral was quite evident: if it was not satisfactory, complain and complain again!

PANEL DISCUSSION

At the afternoon session a general discussion took place on the basis of questions submitted by members of the audience which were answered by a panel consisting of the following:

Dr Hugh Thurston, Chairman,

Dr Roy Pryce, Information Officer, Information Service of the European Communities, London,

Mr Ian Ross (Economics Information Officer, British Nylon Spinners Ltd),

Miss M.F. Hardie (Senior Administrative Officer, British Standards Institution),

Miss C.J. Arlidge (Head of Industrial Research and Education Sections, Federation of British Industries).

Mr. A. Suddons (The Carborundum Company Ltd) asked: *i,* for more information about import/export statistics on a product basis; *ii,* whether the Common Market countries had anything similar to the census of production in this country; and *iii,* what organizations in EEC countries were equivalent to the Board of Trade for statistical purposes.

Mr Ross replied that normally trade statistics were compiled on the basis of the Customs export and import returns, grouped in accordance with the Brussels nomenclature. In some cases the Customs and Excise authorities of the country concerned might be able to supply a more detailed breakdown by products than was normally published, but this was unlikely.

Germany and the Netherlands had very good censuses of production. The Italian census was published only every ten years. The French production statistics were not satisfactory, although trade associations under French law were empowered to collect statistics from non-members in order to give a complete picture. The Belgian statistics were quite good; there was no separate census of production, but the information was given in the monthly *Bulletin de Statistique.*

There was no equivalent in EEC countries to the statistical role of the Board of Trade. Statistics were usually collected on the basis of Customs and Excise material, or by the Central Statistical Office.

Mr R. Sewell (The United Steel Companies Ltd) invited discussion of the possibilities of obtaining quickly foreign standards and specifications, including not only national standards but specifications issued by railways, constructional organizations, and so on; but excluding from the discussion the services offered by the BSI which were, or should be, well known.

The ability to quote without delay against a foreign standard could in many cases, he pointed out, mean getting an order which would otherwise be lost. The ability of information services to refer immediately to such standards became increasingly important with the development of the Common Market.

Miss Hardie said that despite the exclusion of the BSI it would be useful to have any criticism of its service in relation to national standards, of which it had a complete collection. A note* distributed to members of the conference described its services and invited criticism. Outside the national standards it had the standards of certain organizations, and if there was a strong demand for those of a particular organization, steps would be taken to see what service could be provided.

Most firms regularly supplying a market with a range of products would have in their library the relevant standards and keep them up to date through the information provided by the BSI; a supplement to *BSI News,* available to anyone interested, gave a complete list (in English) of European and overseas standards received during the preceding month. Firms would be well advised to obtain in advance the standards likely to be of interest to them. The BSI was discussing with Aslib the possibility of a better service so far as non-national standards were concerned and would like to know in detail the sort of standards wanted.

Mr Sewell said that no criticism of the BSI was implied by his question. He raised it because he was frequently rung up by people who had to quote against a specific standard, national or non-national, sometimes identified solely by an arrangement of letters and figures which, from experience, they could associate with its country of origin. He agreed that it was for individual companies to buy foreign catalogues through the BSI and then order the standards they were likely to want and he was doing this. He had found that sometimes when he wished to borrow a standard from the BSI it was already out on loan. That, however, applied only to national standards. Was there any list of standards issued by foreign railways, constructional and other engineering associations, mining associations, and so on from which standards could be ordered?

They obtained, for example, the Dutch catalogue of national standards, ordered those they wanted and kept up to date through the BSI monthly list, but it would be a great convenience if they could place a standing order with the BSI or the Dutch authorities for all new standards in certain categories. With the BSI they placed a standing order for all British standards. It meant that as a steel and engineering firm they obtained standards for women's underwear, but it was easier to throw away what they did not want than to make a selection. Many foreign countries refused to accept standing orders for categories of standards.

Miss Hardie replied that the BSI had no comprehensive information on the standards of non-national organizations. Fuller information from industry on the types of standard wanted would enable a better service to be provided. She did not know why it was not possible to place a standing order with, for instance, the Dutch organization and would have to make inquiries.

Mr J. E. Wild (Manchester Public Libraries) pointed out that with few exceptions foreign standards were not available in English.

Miss Hardie said that the German and Swedish standards were the only ones issued in English to any extent, the Germans to a considerable extent. The BSI was constantly asked why translations were not available but, with the huge numbers of standards received each month, the translation of all of them would be impossible. If there was a strong view on the part of industry that, for example, all domestic electrical appliance standards should be translated, and if industry would provide the money for the purpose, the BSI would do it and make the translations available in its library. Any industry which wanted standards translated would have to provide the money for the purpose.

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* See Appendix

The Chairman, who remarked that he had difficulties in placing standing orders, said that on all these questions relating to the BSI the answer lay with industry, which must either do a great deal more work itself or give the BSI the money to do it. In general the continental organizations would not accept standing orders for their publications. The only way he had found of getting over the difficulty was by making use of agents or correspondents in the countries concerned.

Mrs G. Langstein (Power-Gas Corporation Ltd) suggested that the BSI should issue lists, as the Germans did, of available translations.

Miss Hardie said that firms having translations had been asked to let the BSI have them so that they could be made available to industry, but the number translated was very small in relation to the whole.

Mr J. H. Bray (George Bray & Co. Ltd) asked whether the panel envisaged the abolition in their entirety of the revenue tariff taxes at present applied in the EEC, such as TVA (tax on added value) and Treasury tax, B/L (Bills of Lading) stamp duties, etc., and that the eventual system used would be comparable to the current United Kingdom system (less Customs duty), i.e. transport and handling costs only.

The Chairman remarked that this was a difficult question on which to say anything at all at the moment.

Dr Pryce agreed; it was far too early even to hazard a guess on what might take place. The question presupposed British entry into the Community, which could not be taken as certain, and sought to anticipate by months, if not years, discussions at present only in a preliminary stage within the Community, details of which would be found in the Commissions' annual reports. It also seemed to assume that, given British entry, the countries of the Community would find British methods best, a somewhat hazardous assumption.

Mr Bray contended that the problem would be even more important if Britain did not enter the Common Market.

Mr J. B. Berry (Board of Inland Revenue Library), invited by the Chairman to comment, said that questions of indirect taxation concerned the Customs and Excise, who were not represented. The general impression given by newspaper comments was that Britain, if she joined the Common Market, would be more likely to adopt the system in use there than the existing Common Market countries would be to adopt the peculiar British taxation system.

Mrs K. Bourton (Constructors John Brown Ltd) said that she frequently required detailed statistical information on the imports of specific chemicals. At present, published information was not available in adequate detail; would this be improved in future?

Mr Ross replied that as long as the majority of the EEC countries followed the Brussels nomenclature there was not much hope of a more detailed breakdown. Where a country did not give its export figures in sufficient detail it might be found that the import figures of the receiving country went into greater detail. In the USA until a few years ago the export figures had been given in much greater detail than they were at present, but they got so far behindhand that to catch up they had to lump them together, unsatisfactory though this might be. In this country the Customs and Excise gave the annual figures in greater detail than those on a monthly or weekly basis and it was possible to obtain special figures monthly with the annual breakdown. Before, continental countries did not seem able to do this. The only hope seemed to be that the trade associations would provide the statistics required.

The Chairman called attention to the article by Sir Miles Thomas, 'Missing Vital Statistics', which he had mentioned when discussing Mr Birtles's paper. That article dealt with chemicals and Sir Miles made the point that it was necessary for future development to have a greater knowledge of markets and better information and mentioned as a specific example that the Board of Trade issued figures on polyethylene which included exports, but exports were the concern of Customs and Excise, who included this product in a ragbag total which covered almost every known plastics material. On the other hand, the industrial statistics handbook issued quarterly by the European Common Market listed many of these products separately. The impression might be given by Mr Birtles's paper that the situation was 'Ask and it shall be given unto you' but that was a somewhat optimistic view. On the other hand if sufficient people asked often enough and pointedly enough there might be some change. There was a moral here.

Mr J. G. Thompson (GKN Group Research Laboratory) raised the question of sources of information on industrial and commercial law in each of the Common Market countries, particularly concerning cartels, monopolies, and restrictive trade practices.

Miss Arlidge said that the FBI had made a study of restrictive trade practices and could supply detailed information on the subject. It had a department whose job it was to examine all laws affecting members and which, naturally, in connection with this country joining or negotiating to join the Common Market, would be investigating the legislation in Common Market countries.

Mr Thompson mentioned that he had been in touch with some members of the legal profession, but they seemed to know nothing about the question. Was there any other source available? The only source he had discovered was a Professor of the University of Pennsylvania, who had been able to recommend certain books and other publications.

Miss Arlidge recalled that an expert from the Coal and Steel Community had told a meeting of the Iron and Steel Institute that he foresaw a field day for the lawyers.

The Chairman said he had been told recently that there were only two people in London qualified to give an authoritative opinion on French law. On questions of restrictive practices and cartels there was a list of articles and books in the bibliography and there had been an authoritative book on restrictive practices put out by Stevens.* Mr Ross told him that the Harvard Law series also dealt with this topic. That might fill an immediate need, but if anything in the nature of counsel's opinion was wanted it might be necessary to go to the Continent to get it.

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* *Comparative aspects of restrictive trade practices*, Stevens & Sons Ltd, 1961

Miss C. Noakes (Institute of Bankers Library) suggested that the International Institute of Comparative Law might help.

Mr Thompson said he had come across a publication, he thought by the Institute of Comparative Law, costing 21*s*, which gave a concise summary of the law relating to restrictive practices in Common Market countries. It was worth reading as an introduction to the subject.

Mr Peter Spiro (Institute of Bankers Library) said the subject was within the province of the Institute of Comparative Law. It was necessary to be aware of what the various bodies were doing because resources in this field were being dispersed and many organizations were doing similar or even the same work. Consideration should be given to what sort of central source there was or should be in this country for this kind of information about Common Market countries. Did information officers and librarians feel that they would support a new kind of body, or perhaps Aslib, for this purpose? It would be interesting to hear Mr. Wilson's views.

The Chairman agreed that this was an interesting question which might well be discussed. The Common Market countries were often thought of as a group, but was there need for a service split up between these countries? Some people would be concerned with only one or two of them.

Mrs T. Parfitt (Royal Institute of International Affairs) confirmed what the Chairman had said about the book published by Stevens, which cost 18*s*.

Mr D. Llewellyn Davies (Industrial Welfare Society) mentioned that the Industrial Law Society, which had been formed about six months ago, was very interested in this question.

The Chairman regarded the point raised as important. These bodies were growing, but without support there was a limit to the amount of growth they could themselves engender. They should be given the demand which would allow them to expand and provide the sort of service required.

Mr J. B. Berry called attention to an American book, *The European Common Market: a legal profile*, in two volumes, which, while expensive, was good on the legal aspects of the subject.

The Chairman said that Mr Ross had mentioned to him an OEEC publication which dealt with restrictive practices and some aspects of cartels, but they could not recall the title.

Mr C. E. Durrant (A. E. Reed & Co. Ltd) asked for information on prices, on which a great deal had been published but not in a collated reference form; on links between companies; and on internal production figures, which were not so easy to obtain as import/export figures.

The Chairman suggested that as internal production figures had already been dealt with, attention should be concentrated on the first two points.

Mr Ross, on the question of prices, suggested that the catalogues of the large stores were a useful source of information on retail prices. His own organization obtained a large number of catalogues from the larger stores and obtained in that way a good insight into retail prices.

On the question of links between companies he had mentioned two publications. One that he had not mentioned was a directory, *Who owns whom* (Continental Edition), published by Roskill, which was quite good. *Opera mundi Europe* had a large section devoted to tie-ups between companies. The Board of Trade had acquired a great deal of information on the question of association between companies, but it might be difficult to get it from them as it was regarded as confidential. Both the publications he had mentioned would answer questions from subscribers.

The Chairman, on the question of link-up between companies, mentioned a German publication in English, *German international,* produced in Bonn, which dealt in each monthly issue with a section of German industry and showed foreign participation, including the percentage shareholding and who held it, and which gave a great deal of information on link-ups and connections in Germany. Another source of information which he had found useful was provided by the banks. Some of the larger banks provided this type of information service to anybody who asked for it reasonably, and free, but some of the smaller banks were reluctant to pass this information on unless they felt that some business for themselves might result. He had the impression that the amount of information available on company integration and that sort of thing was increasing.

Dr Pryce added that in this country an occasional supplement to the *Britain and Europe Newsletter* was devoted to this topic.

Mr Ross said that in trade literature there were occasional comments on the subject. They themselves had built up information from these various sources.

The Chairman remarked that perhaps the most obvious source in the United Kingdom would be Exchange Telegraph or Moodies. They had continental coverage. It was not their fault that it was not so good as their other coverages.

Mr F. G. Penson (ICI, Billingham Division) pointed out that company reports were a valuable source of information and asked for suggestions on how to obtain them.

Mr Ross replied that one drawback was that many continental company reports were not nearly so informative as many in this country. The best source of information was obviously through brokers.

Mr R. W. Thomas (British Filters Ltd) said that there were often major difficulties in obtaining economic information about industries in Common Market countries. The Board of Trade Statistical Library had official material and some trade associations and large firms collected other publications relating to their specialized interests, but no library in this country maintained a general collection of books or other publications on the structure of industry in other countries. After trying sources in this country, how would the panel find out what had been published on the structure of particular industries in the Common Market countries? Having obtained the titles, how would they obtain the publications at minimum expense of time and money?

The Chairman suggested that this implied willingness to cope with a thesis on, for example, the structure of industry in the Netherlands written in Dutch, which he knew was available but had not been translated. The question was primarily an organizational one. An organization with agents on the Continent could work through them, but an organization concerned with United Kingdom and Commonwealth trade and with little knowledge of or contact with continental countries would be in a different position.

Mr Thomas explained that the problem was particularly important for a small firm such as his own, which was interested in a large number of industries but whose resources were too small to find out much about them. It had been stated that morning that the Guildhall Library and the Board of Trade collected reference books on particular industries, but his firm was interested in brewing and no library in this country had the standard book on the German brewing industry, so that they had first to find out the title and then import it specially.

Miss Arlidge said that this was a type of problem often presented to the FBI by its smaller member firms and by some trade association members which included large number of small firms. Probably the best plan for such a firm was to make its needs known as strongly as possible in the right quarter. In Mr Thomas's case the right quarter would probably be the trade association. There was, she believed, a library and research association for the brewing industry and, while it did not set out to deal with economic questions, it no doubt had an information department which would be ready to provide the information required.

Mr Thomas said he had found the Brewing Industry Research Foundation and the American brewing industry helpful, but not on this question. His firm was interested in a large number of industries and could not belong to all the relevant trade associations.

Mr Ross believed that very few books had been published on the structure of industry. When he had asked what was available on the German textile industry he had been asked in return 'What do you publish about your own industry?' There seemed to be only about three books which were any use. He had tried the Board of Trade and they had nothing. He wondered how much had been written.

The Chairman said that the Dutch had what was essentially a planned economy and worked on the five-year-plan system. In a planned economy; with controls on wages and housing, it was necessary and also easy to carry out research into the structure of industry and the three leading economic schools in the Netherlands had done a great deal of work on this, in association with the Government departments that had to take decisions which required a knowledge of the structure of industry, and they had been eminently successful. Those comments did not necessarily apply to Germany, but outside the Common Market work had been done on the structure of industry in the Scandinavian countries, probably for the same reasons as in the Netherlands.

It was difficult to summarize the discussion which had taken place, but a number of points arose from it. First, it was for individual firms to use their initiative in two ways: *i,* to assess the bodies which were evolving and developing in this country to cope with the changed circumstances due to the existence of the Common Market, and *ii,* to see the change in the character of and skills required by economic information services. One could not expect to get an improved and widening service from a specialized body on questions of, say, comparative law or some other specialized subject unless one asked for it. One could not expect the Government to improve its services, even slowly, unless complaints were made.

Another point was whether or not there was room for a body in this country which would devote itself to this general topic of the Common Market, which would provide an information service and respond to the demand on a broad front as distinct from the various specialized fronts of the different legal institutes and so on. This was something which might well be discussed at greater length. If delegates felt that this was a role which Aslib might fill they should make their views known.

So far, the papers and most of the discussion had been concerned with short-term aspects of the Common Market, the immediate needs, the difficulties, and the changes necessary. To conclude the conference Miss Arlidge was going to talk about some of the longer-term aspects, a difficult field, in an attempt to provide a balance to what had been said earlier.

MAKING COMMUNICATION LINKS EFFECTIVE

C. J. ARLIDGE

Head of Industrial Research and Education Sections, Federation of British Industries

The interesting and well-informed contributions made by Dr Pryce and Mr Ross this morning have given, in some measure, the size of the problem facing all of those concerned with sources of information in the years of negotiation with the European Economic Community and afterwards. Bearing in mind the wealth of published material already appearing, this conference may well provide a fitting opportunity to pause and clear our thoughts before initiating any further information publications in this field. The major problem of the vast quantity of Common Market literature appearing in a language other than English is in itself one deserving early attention. At a lecture earlier this year about the European Iron and Steel Community, warning was given of the misinterpretation liable to follow from the simple use of the phrase 'The Common Market'. It is probable, however, that the looseness of the term in this context can be accepted with comparative safety when compared with the apparent dangers of quoting from the English version of the Treaty of Rome, to which one of this morning's speakers referred.

I have been asked to put before you some suggestions for the future in the light of the previous papers. In fact I have chosen the title 'Making communication links effective' because I believe that whilst some growth in economic information sources will be inevitable as a result of the Common Market negotiations, the most urgent need is a definition of needs, followed by action to make really effective the existing information sources.

'Communication' is a fashionable word and its meaning in both the singular and plural form has become increasingly obscure. The Oxford English dictionary gives the following definition: 'the act of imparting news, information given, connection between base and front.' This last seems to provide a good ideal for any information service. One of the greatest difficulties in information work is perhaps ensuring the successful infiltration of information given.

The whole question of communication is one to which those responsible for information services should give serious personal as well as, if I may coin a phrase, business thought. Information officers are, as a group, a privileged few. After consulting some of the sources of information to which we have been referred today, it would be well to consider the wider implications of the Common Market negotiations upon which we, as a nation, have embarked and bring them to the attention of friends and acquaintances who might otherwise never have the opportunity of discussing them.

In today's papers we have been given a glimpse of the overall development of the European Communities. If we go away and each select just three or four of the channels of information put before us and accept a personal as well as a business responsibility for their use then we can claim to be taking some steps to make communication links effective.

We have in this country a somewhat unenviable reputation of not being very good in peacetime at working together to achieve a common goal. The EEC information booklet draws attention to the aim of the Community being 'to work out and apply the common rules, the activity is in fact political in kind although economic in field of operation. It aims at integrating the actions of producers, workers, and business men and also at harmonizing the policies of national governments.' I should like to stress the second sentence, from which it is obvious that we must radically alter our normal mode of thought and action. We shall in fact have a much greater dependence on effective communications. We must be prepared for both personal and business problems taking a new shape.

We, in the FBI, would expect to take practical action as far as these new problems affect manufacturing industry, but representing as we do so many diverse interests, specialized information, on for example questions of technical legislation, may be expected to come also from trade associations and other national organizations. Without wishing to express anything but a personal opinion, the introduction of continental timetables in questions of transport may be expected to simplify intercontinental arrangements once the principle has been accepted that 12.30 is noon plus a half-hour.

The significance of communicating standard specifications has been accepted by this conference by the presence of a representative of BSI. It is a subject to which I attach considerable importance. The present need for better communication is illustrated by a very ordinary example of the slowness of adoption over here of the new international paper sizes. Having served on a British Standards Committee at the time that the BSI decided to change over to the international standard paper sizes, I noted the changeover personally. But I do not recall receiving since then a single invitation to purchase files or paper of international standard size. It may be that the promotion of British Standard practices could be assisted by increased joint action between the BSI and the trade associations. The field of international standardization is one where a much more active part could be played jointly by industry or BSI, possibly with more support from research associations.

Turning to the vexed question of foreign languages and the pressing need for a greater awareness of their place in written and verbal communications, I am glad to be able to report that the FBI is at present studying the use, or lack of use, in this country of foreign languages; a working party has just completed its study of this subject. Over the past thirty years half-a-dozen major committees have made recommendations on the need to take foreign languages more seriously but, so far, the impact of their resolutions has not been considerable. It may be said that for the past two hundred years English has been the most widely used language in international trade and communication. The assumption that it would remain so may be justified, but it is the considered opinion of experts that this cannot be true. The present situation requires careful examination.

There are two rather different aspects of the part to be played by oral communication in a foreign language. It is rather a different problem from that put by the need for accurate English versions of the Treaty of Rome. First and foremost industry needs, perhaps especially on the sales and technical side, many more people who can speak at least one foreign language uninhibitedly. From the public relations point of view a man who can make himself understood on his own subject with the aid of diagrams and two or three thousand words of the other man's language is a very valuable member of his company's staff. Equally valuable is the man who could make a rough survey of an economic or technical article, or patent, to assess its value for verbatim translation.

A vocabulary of two or three thousand words may seem small to the linguist, but this idea has led to the development of 'Le Francais fondamental' several years ago, when a dictionary of 3,000 words was compiled to simplify the teaching of French to mature students, principally to assist trainees in the French technical assistance programme to gain as much as possible from their brief stay in France. A 'basic French' in the best interpretation of the term has been developed.

Technical assistance presents, of course, a communications problem of a very difficult and special kind and one on which I am not competent to speak. It is, however, a revealing sign of the success of the EEC and the rate of economic growth, at least in France, that a complete section of its handbook is devoted to the plans of the Community for technical assistance to the under-developed territories.

In conclusion, I should like to suggest three thoughts for future action:

1. That we all use to the fullest possible advantage the opportunities given us through our work, in whatever sphere that may be, to gain knowledge about the wider implications of the Common Market;
2. That we communicate this knowledge as far as possible to the widest possible circle of friends and acquaintances;
3. That we analyse carefully the gaps that appear to exist in the present sources of information to ensure that the solutions proposed may assist in the task of effective communication.

DISCUSSION

Mr M. J. W. Mooney (R. B. Pullin & Co. Ltd) said that in the motor industry some time ago an informal group of information officers had come together to co-operate and exchange information about the work that they were doing. There were topics into which the element of competition did not enter. There seemed to be room for a good deal of work on these lines and he would like to see Aslib used as the channel for any voluntary co-operation between members for the exchange of information which would not affect the business ethics of the firms concerned. They should try to help themselves before asking others to help them.

The Chairman observed that that was a very interesting comment and it would be for the delegates themselves to say whether or not they regarded it as a good idea. There would have to be some way of channelling the information to Aslib to make known what was being done. He recalled that when doing economic research work on shipping he often came into possession of information which would have been useful to others, but he had been unable to give it as he might not have received permission to do so. Might not good intentions be frustrated by that kind of difficulty?

Mr F. Liebesny (British Aluminium Co. Ltd) said that after listening to previous discussions and to the present one he felt terribly confused. Were they talking about sources of information or about how to find out sources of information? They had been saying the whole afternoon that Aslib could do this or that or should do this or that. He was not speaking on behalf of Aslib, whose members could speak very well for themselves, but there seemed to be some misconception of its position. Aslib was not a storehouse of technical information but a clearing house. It told him where he could find the information; it did not give it.

In the commercial field this mistake was being made. People wanted Aslib to have a complete set of statistics, of translations of foreign standards, and so on. He thought that was impossible. Aslib should tell them where some of the information could be found, and for this there were already certain channels of information which could help in compiling special bibliographies, for instance. They must not fall into the trap of saying that Aslib could do the work; its job was to guide them to help themselves.

Mr M. G. W. Agostini (Specifile Overseas Ltd) endorsed what Miss Arlidge had said on international paper sizes. He had tried to raise the subject at last year's conference but had been almost howled down. The building industry, for which his company offered an information service, had gone ahead with the standardization of paper sizes and more and more manufacturers were taking it up. If information was all on one type of paper accessibility was achieved. Standardization did not mean that all buildings would look alike; when information was readily accessible, imagination was stimulated.

Mr J. A. Allder (Unilever Ltd; Secretary, Aslib Economics Group) said the source of economic information was a point on which some members of the Economics Group felt that Aslib was particularly weak at present. It was a subject with which the Group were very much concerned. The suggestion made by Mr Ian Ross that afternoon deserved further study and perhaps the Economics Group and the Aslib Council could get together to study it.

Mr Ross said he helped hundreds of people from other organizations, but he could not make this a full-time job or he would not be able to do any of his own work. It might well not be Aslib's function, but the time would come when there would have to be, as there was in some other countries, some central organization staffed by specialists in information work, not people who were byproducts of research organizations. As the demand for information grew, there ought to be some organization to which people could come who could not afford to spend £100 here and £100 there and who did not often want to use the material; they should be able to get what they wanted quite easily from this central organization and not have to go to others who were trying to do another job. That was not necessarily Aslib's job, but it was perhaps a field in which Aslib might work, if there was a demand for it.

Mr Liebesny said they did not expect Aslib to do it, but they hoped that Aslib would give guidance in setting up such an organization, because the need existed. On the other hand, Dr Pryce had generously offered his services. More thought must be given to the matter before setting up a grandiose national library of economics, or whatever it might be called.

He wished to correct an impression which might have been given by the last speaker at the morning session. The Board of Trade had a register of specialist translators, but there were several other such registers; there was one at Aslib, and the Institute of Linguists ran a register of interpreters and translators. He believed that the FBI were compiling one, and there were several in the provinces. He would regard the Board of Trade register with suspicion, because the people on it were prepared to work for rates fixed by the Treasury, which were abysmal.

SUMMING UP

The Chairman said the conference had covered such diverse ground in a relatively short space of time that it would be over-ambitious for him to sum up. He thought there would be general agreement that they had learned a great deal and had been provided with a great deal of information. The obvious question was what was to be done in the future and, to deal with a practical point relating to sources of information and their coverage, they might consider further one-day conferences, or perhaps even half-day conferences, which would deal with the Common Market countries one by one and go into further detail about sources of information, statistical, official, and unofficial. If that sort of thing were to be arranged it would require a great deal of planning, investigation, and research. It would depend entirely on the demand for it. It was up to people to make their needs known.

In the longer term he seemed to see two aspects of the changes to which information services and information officers would have to adapt themselves. First, there were those general changes that came about through closer association with the Continent and the expansion of British trade there and secondly there were those specific changes which were caused by changes in the manner of doing things and practice and standards. Several contributors had pointed out that such changes were likely to occur. This country might abandon purchase tax in favour of a turnover tax, it might change the standard sizes of paper and so on. These things all implied very real changes in the type and quality of information services which would be required.

One of the questions which this posed was whether or not there was a need for specialized training or some kind of emergency training for information officers. Another was whether it was sufficient to rely on outside bureaux for translation services. There was Miss Arlidge's point about basic French and acquiring facility in languages. There was an even larger question, whether a point had been reached with economic information services analogous to that reached by scientific and technical information services just after the war. Was there likely to be a rapid expansion in the demand for this type of service?

He knew that the Director would give careful thought to all the comments which had been made, with the interest of Aslib members in mind. The delegates would wish to thank him and his staff for preparing the conference, to thank the Economics Group Committee of Aslib for the excellent exhibition of literature which they had provided, and to thank the speakers and panel members.

Mr Leslie Wilson (Director, Aslib) in closing the conference, expressed the hope that it had provided a useful and interesting curtain-raiser to the discussion of Common Market information problems. No one was more conscious than he that a single day's discussions could go only a fraction of the way towards answering the multitude of questions posed by this extremely complex subject. The conference had therefore been conceived primarily for the purpose of imparting basic information about some of the sources and of encouraging members to think about steps they needed to take in order to cope with a changing pattern of trade. The Chairman had suggested that it might be desirable to move on to a whole series of conferences dealing individually with each of the countries of the Common Market area. That was one possible approach and there might be others; but in deciding how it could be of greater service, Aslib would need much help and guidance from its members.

The suggestion had been made during the discussion that Aslib should set itself up as the central source of information on the Common Market to which all could turn. This was not possible—a logical corollary would be that Aslib should also become the central source of information on all economic subjects, science and technology, and the social sciences. Where to draw the line? Aslib's terms of reference were to act as a central clearing house and finger-post to the individual sources themselves, in itself a difficult and complex task. It was true that, in special circumstances, Aslib would go to the source on behalf of an inquirer, but Aslib's purpose was not to replace Dr Roy Pryce's organization and Mr Birtles's office, but rather to help members to make the most effective use of them.

He wished to emphasize another aspect of the conference. He had, deliberately, called the conference a conference on the implications of the Common Market for information services. The establishment of the Common Market, and the probable entry of the United Kingdom into it, had created a situation analogous, in trading terms at least, to that which would have existed had the British Empire been created overnight by an act of common consent. Some members present would recall the variety of information activities to which the growth of Empire trade and Empire preference had given rise. Was it not likely that the growth of the Common Market might present a similar challenge? Was it not also conceivable that British entry into the Common Market might give that decisive impetus to economic information services that the needs of the last war had given to scientific and technical information services? He hoped, therefore, that those who had attended the conference would go away not merely thinking how they, as individual information officers, could be more effective in relation to the Common Market, but also pondering that the nation's need for information might have to be rethought in terms of the expansion of its trade with Western Europe, its economic integration, and ultimately perhaps its political integration in some way with Western Europe. These might well be very long-term implications, not merely, for example, as to the greater services to be sought from the Board of Trade but also the funds which the Board of Trade would need in order to provide them; there might be implications for the recruitment of greatly expanded numbers of economists and social scientists and linguists and for the provision of short-term and long-term training facilities for them. The prospect was an exciting and challenging one for industry and commerce and they would do well to think constructively about the opportunities for service which the situation presented.

In conclusion, he thanked the Chairman for the extremely able and genial way in which he had conducted the proceedings of the conference.

APPENDIX. STANDARDS QUESTIONS

NOTE BY THE BRITISH STANDARDS INSTITUTION

Knowledge of the standards acceptable to customers in different markets is an essential preliminary to export of an increasing range of goods. For some products there may be statutory regulations or other virtually compulsory requirements, linked with standard specifications, and there will often be compulsory approvals procedures to ensure compliance. Though this is not new nor confined to European trading, the Common Market situation is bringing it forcibly to the attention of firms to whom it has been relatively unfamiliar.

The search for agreement on a common basis for national standards—whether of terminology, methods of test and sampling, or specifications—in order to simplify production and trading has also been going on over many years through various international bodies—International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), and International Commission on Rules for the Approval of Electrical Equipment (CEE), but again the Common Market has focused attention on this aspect of standards and is giving it a new urgency. Despite the efforts which have already gone into international standards discussions, there is still a large field to be covered by the international organizations themselves and supplementary work now being undertaken in Western Europe to secure greater identity of standards important to intra-European trade within the framework, so far as possible, of the wider international agreements.

The first part of this note deals with the information services on Common Market and other Western European standards which the BSI offers to industry, the second part with the arrangements for promoting greater alignment of their standards among the Western European countries.

1. *Information services on European standards and requirements*

The growing interest in trade with Europe arising from the Common Market and the EFTA arrangements, particularly of course the possibility of the United Kingdom joining the Common Market, has already increased the demand on BSI's existing information service about European standards. This has shown that many firms, perhaps because they have been concentrating on the home market, have little idea of the complexities of compliance with oversea requirements or the number of European standards that exist. The national standards of all the Western European countries (as well as the standards of other oversea countries) are held by BSI and something like two hundred new ones are received each month. A supplement to *BSI News* lists the titles in English of those that have been received. BSI can obtain further copies of any standards from the national standards organizations for member firms, or in cases of urgency can lend copies. It must be pointed out, however, that for the most part these European standards are in the original languages. If translations are available in BSI they will always be supplied; individual firms can help one another by making available to BSI, as the central information point, any translations they themselves have.

Information on statutory regulations and acceptance procedures related to standards in some special fields is available in BSI, e.g. on electrical equipment (including CEE approval procedures), boilers, and pressure vessels, but the official United Kingdom source of information on overseas regulations is the Board of Trade.

The international recommendations of ISO, IEC, and CEE are of course obtainable from BSI and while it is normally a national standard that is quoted for purposes of trade with particular countries, the international recommendations will repay study, as showing for example an accepted series of metric dimensions. Some metric series may also be available in British Standard publications.

Where firms require information on oversea standards outside the categories described, BSI can usually direct inquirers to the appropriate source.

We shall naturally welcome any suggestions for improving our information and library services and are at present reviewing them with particular reference to the problems arising from the Common Market.

2. *Common standards in Western Europe*

The creation of a 'common market' has as an obvious corollary the unification of standards within the market and of the regulations and the acceptance procedures related to them: otherwise the purpose of freer trade may be frustrated by technical barriers. When the Free Trade Area project was being considered, the standards organizations of the potential members had discussed the problem of common standards and after the signing of the Rome Treaty it became clear that the 'Six' were giving a good deal of attention to it and in some fields were getting down to details. After the establishment of EFTA it was jointly agreed that the standards bodies of both EEC and EFTA should work together in an effort to align standards in Western Europe as a whole and there are now two steering committees: one dealing solely with electrical standards and another with the remainder, working groups being established on the technical detail. To a considerable extent the effort is concentrated on implementing recommendations already made in the international standards organizations, with any supplementation or variation as may be agreed to be necessary; there may also be special studies (mainly outside the electrical field) of subjects not yet dealt with in international recommendations or of more detailed aspects than are appropriate for agreement in ISO. No final agreements have yet been accepted but on a few electrical subjects the work is near completion.

Agreement on the standards underlying regulations in the technical sphere would go a long way towards unification of the regulations themselves, as envisaged in the section of the Rome Treaty concerned with approximation of laws which have an influence on the functioning of the Common Market.

Information on the progress of the work in the Western European Standards

Committees has been and will continue to be given in *BSI News*, and the United Kingdom part in it will be organized in the same way as other international standards work under the guidance of the appropriate BSI committees. When agreement has been reached through this machinery the national standards bodies will be expected to amend their standards as far as is necessary.

Letters to the Editor

PUNCHED CARDS

Dear Madam,

I have been compiling a concept co-ordination, or 'Peek-a-boo' system of reference during the past year.

Some aspects may be of interest to you because, with due respect to my erudite colleagues, letters and articles show minor misconceptions of the nature and limitations of the technique.

Originally patented in the USA in 1917 for 'the determination of birds' the correlation of the concept was indicated by the position of crosses on cards titled with particular characteristics of the birds. Later W. E. Batten substituted punched holes for the crosses. The separate file of data cards was kept in numerical order and the number in these relevant to an inquiry was indicated by the position of the hole or cross on the former system.

This mechanism has been much described recently but less has been said about the working philosophy to be applied.

There is a great difference from normal alphabetical indexes. Thus electroplating, electromagnetic, electromachining, etc., only exist as the syllables electro-, and plating, magnetic, machining, heading cards.

Instead of giving the key number to find the information by a searching, inductive associative process as with an alphabetical index, an association synthesis involved is done mechanically, by superimposing the punched cards; to find the position of a hole common to each concept titling them.

Although an index made for the field covered by the system may exist, it is incorrect to assume that it can be applied to the new system, although it may be used as a guide. Also homonyms and synonyms are equally likely to introduce confusion in concept correlation as any other index depending on language.

For example whether two cards, one headed 'Hydrogen' the other 'Chloride,' or whether 'Hydrochloric' and 'acid' will be the definitive titles to be associated to give the key number for 'hydrochloric acid,' is a matter which affects the structure of the index permanently. So a working philosophy must be evolved as early as possible to prevent variability and choice confusing the index.

There is the problem of word order; 'Steel for trucks,' and 'Trucks for steel,' is not certain, unless an indicator system is incorporated to avoid ambiguity.

It would appear that our decisions are dictated by familiar etymological syntactic forms.

To impose any additional arbitrary classification system, *e.g.* to call the first '1' and the second '2', at once leads to conflict with traditional linguistics as can be observed with edge-punched cards where a separate index has to be consulted to translate meaningful words to edge-hole positions before searching, there being thus a numerical system as well as the equally arbitrary alphabetical one to be operated.

I have assumed that the English language is adequate as a directive and likely to result in the least cumbersome system until complete mechanisation is introduced, so I would welcome any opinions based on logic or experience which will enable me to extend its capabilities.

In conclusion, I would say that we only get out of the system exactly what we put into it, so if anyone has overcome this difficulty it would be very interesting to hear.

Yours truly,
RUPERT L. TAMS,
Information Officer for Head of Laboratories

UKAEA Reactor Group, Preston, Lancs.
31st May 1962

REMOVING A LIBRARY

Madam,

We have recently moved our library and, as we were unable to find any helpful literature on the subject, we are writing this letter in the hope that the experience we have gained may be of interest to others who may have to perform the same task.

Our library stock consists, approximately, of 3,000 books, 170 boxes containing pamphlets, and 200 current periodicals. Three-quarters of the periodicals are not bound; nine runs start before 1900, twenty between 1900 and 1920, and one hundred between 1920 and 1940. The stock was distributed in Building A (four rooms and a corridor on the first floor, and one attic) and in Building B (two rooms on the ground floor). The new library is in Building C, and the three Buildings A, B, and C, are in different parts of the grounds.

The question of employing a commercial firm of removal contractors was considered, but rejected because, although the removal itself would be done more quickly, we knew that much more handling and sorting of the material would be required after the move. Before the move we did the obvious job of disposing of unwanted material; we also arranged that periodicals being bound should not be returned until they could be delivered to the new premises. When the new library was ready for occupation we marked the position of each periodical on the shelves, and then we started.

The removal staff consisted of two of our own maintenance staff, who were specially allocated to us for the job, and one casual labourer. We borrowed some transport boxes from the National Lending Library; these were invaluable, and we are very grateful for the loan. The removal staff used a small trailer; this was moved from building to building either by means of a small electric horse or by means of a small vehicle; the trailer was manhandled in Building B, but in Building A all the boxes had to be carried because of the different levels. The actual move took twelve days, and at the end of that time most of the periodicals were in their allocated places and the books were arranged in order. The functioning of the library was not interrupted, although it must be said that there were times when the service was maintained with difficulty.

The removal involved much hard physical work, and during that time the two senior members of the library staff, to all intents and purposes, had to neglect their usual work. The backlog is gradually being caught up, and the move has been very well worth while.

Yours faithfully,
MARGARET HORSMAN,
Librarian

Wool Industries Research Association,
Torridon, Headingley, Leeds 6
16th May 1962

CLASSIFICATION

Mr Raymond Moss asks us to point out that the exclamation mark appearing in his letter in March (page 68) and referred to in Mr Cleverdon's letter in the May issue was not provided by him. Mr Moss used a query at this point.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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A Bedfordshire bibliography, with some comments and biographical notes [by] L. R. Conisbee. [Luton] 1962. 333 p. 80*s.*

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Professional and non-professional duties in libraries: a descriptive list compiled by a sub-committee. . . . London, 1962. 77 p. 18*s*; 13*s* 6*d* (members).

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MEMBERS' ADVERTISEMENTS

The charge for advertisements in these columns is 4*d* per word, minimum 5*s*. An additional charge of 6*d* is made for the use of a box number.

TRANSLATIONS into/from Dutch, from German and French. Also scanning/abstracting Common Market publications. Speller-Kuijpers, FIL, NGV, 5 Stratton Close, Hounslow, Middlesex. Hounslow 6954.

TRANSLATIONS, TECHNICAL, SCIENTIFIC, all languages, by specialists with sound technical and scientific qualifications. J. Smuts, BSC(ENG.), FIL, 12 Thorndene Avenue, London N11. Stamford Hill 8564.

WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Member of Translators' Guild. Roumanian and French. 161 Rivermead Court, London SW6. Renown 1912.

Appointments vacant

ASSISTANT LIBRARIAN required for expanding technical library, FPE qualification desirable, GCE 'O' level in English and maths essential. Age 17 to 20. This post would be a good opportunity for a girl wishing to make a career of library work. New modern building, good rate of pay and staff conditions. Please apply to the Personnel Officer—Women, Ferranti Ltd, Western Road, Bracknell, Berks.

ASSISTANT LIBRARIAN. Senior assistant required for library of the British Cast Iron Research Association. Minimum qualifications ALA or group A at least of Registration examination and good reading knowledge of German. Technical library experience would be an advantage. The Association's laboratories are in pleasant country surroundings twelve miles from Birmingham. Salary appropriate to qualifications. Contributory pension scheme and staff canteen. Write for full particulars of the appointment and application form to the Secretary, The British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham.

CENTRAL ELECTRICITY GENERATING BOARD. Applications are invited for the appointment of LIBRARY ASSISTANT at Berkeley Nuclear Laboratories, Gloucestershire. The duties of the appointment will include cataloguing and classifying books and reports, compiling bibliographies, and giving assistance to the staff of the laboratories in finding the answer to technical problems. Library experience, preferably in a scientific, technical, or reference library, is essential. Hours 9 a.m. to 5.30 p.m., five-day week, and special transport facilities available. Salary on scale £600–£700 per annum. Applications quoting age, experience, present salary to be forwarded to the Appointments Officer, Central Electricity Generating Board, 24–30 Holborn, London EC1, by 30th July 1962. Please quote Ref. AS/331A in correspondence.

EXPERIENCED SEARCHER and technical abstractor (aged 25–30) with a chemical background and preferably some knowledge of French and German is required in the patents section for varied and interesting work. A salary commensurate with qualifications and experience will be paid to the successful applicant, who will enjoy the benefits of the company's contributory pension and bonus schemes as well as luncheon vouchers. Applications stating age, qualifications, experience, and present salary, which will be treated in confidence, should be addressed to the Staff Manager (Ref. Y), F. W. Berk & Co. Ltd, Berk House, 8 Baker Street, London W1.

IBM BRITISH LABORATORIES. Applications are invited from suitably qualified librarians for the position of REFERENCE LIBRARIAN. The person appointed will be responsible for operating the reference and inquiry service. Subsidiary duties include circulation control, interlibrary loans, and literature searching. The library has set up a number of data processing techniques aimed at reducing routine clerical duties and is also experimenting with new applications of data processing machines to library operations. This position offers an exciting opening to librarians who are keen to use the latest techniques in library operations. Applications should be sent to the Personnel Manager, IBM World Trade Laboratories (Great Britain) Ltd, Hursley Park, Winchester, Hants.

LIBRARY ASSISTANT (female), preferably in age group 21–25, for technical library near Tadworth, Surrey. Applicants should have previous library experience, some knowledge of French and German, and be able to type. Apply Personnel Manager, Vitamins Ltd, Upper Mall, London W6.

QUALIFIED LIBRARIAN, with some experience of industrial or reference libraries, required as departmental librarian. Interests to be served include computer and electronics research and development. Good salary and staff conditions. Contributory pension scheme. Canteen. New modern building. Application to Personnel Officer—Women, Ferranti Ltd, Western Road, Bracknell, Berks.

THE FIRE PROTECTION ASSOCIATION invites applications from science graduates (female) to take charge of the technical library and information section. Duties are those usual to a technical library plus responsibility for handling technical inquiries. Experience of abstracting technical information particularly desirable. Non-contributory pension scheme. Write stating age, experience, and salary required to the Secretary, Fire Protection Association, Aldermary House, Queen Street, EC4.

For Sale

OFFERS invited for a supremely well bound (goatskin) complete run of *Chemical Abstracts* from 1944 to 1954 (43 volumes) with fourth decennial index, 1937–1946 (six volumes). Box 362, Aslib.

TECHNICAL LIBRARIAN

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 **August 1962** **Number 8**

ASLIB CALENDAR

1962

September

THUR.13. Furniture Group meeting. See paragraph below.
WED.19. Winter meeting. See paragraph below.
Electronics Group visit to Royal Radar Establishment.
THUR.20. Technical Translation Group meeting at Aslib.

October

MON.1. Midlands Branch meeting. See paragraph below.
TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.
TUE.16. Chemical Group meeting. See paragraph below.
WED.17. Evening course on giving references in catalogues and bibliographies begins. See paragraph below.
THUR.18 – FRI.19. Course on photographic copying in the information department.
MON.22. Winter meeting. Speaker: Dr N. R. Hood, O.B.E.
TUE.23 – FRI.26. Junior introductory course to information work.

November

THUR.8. Technical Translation Group sherry party at Aslib.
FRI.16. Northern Branch conference in Bradford.

December

TUE.4. Midlands Branch meeting.
THUR.6. Technical Translation Group meeting at Aslib.

1963

March

MON.25. Midlands Branch Annual General Meeting.

June

FRI.14 – SUN.16. Electronics Group annual conference at Ashridge.

Honorary Officers 1962–3

Sir Lindor Brown, Waynflete Professor of Physiology in the University of Oxford and Biological Secretary of the Royal Society, has been appointed President of Aslib for a second term of one year.

Sir Owen Wansbrough-Jones, Technical Director of Albright & Wilson Ltd, has become a Vice-President and Aslib welcomes his interest in its work. He succeeds Sir Ben Lockspeiser, who has completed six years in office and for whose help and interest Aslib is deeply grateful.

Mr G. Weston, Associate Director of the British Standards Institution, has been appointed Honorary Treasurer for a fourth year, and the Honorary Secretary is Mr D. T. Richnell, Librarian of the University of Reading, who is appointed for a third year.

Elected Members of Council

In this year's Council elections there were seventeen candidates for the eleven vacant seats. The following candidates were successful: C. W. Cleverdon, College of Aeronautics; G. H. Davison, United Steel Companies Ltd; Miss M. D. Gauntlett, Kodak Ltd; G. P. Henderson, Guildhall Library; A. H. Holloway, Individual Member; F. H. Smith, Royal Aeronautical Society; J. R. Stocks, Shell International Petroleum Co. Ltd; L. G. Tootell, Sheffield City Libraries; G. Woledge, British Library of Political and Economic Science; G. H. Wright, Hatfield College of Technology; J. E. Wright, Institution of Electrical Engineers. Ballot papers were received from approximately 25 per cent of those members entitled to vote.

Co-opted Members of Council

The Council has since co-opted Austen Albu, M.P. and Miss M. F. Webb, Patent Office Library, and has agreed to co-opt a representative of the Aslib Groups to be nominated by the Groups.

Winter Meeting

'An outsider inside information: USA 1961–1962' is the title of a lecture by R. A. Fairthorne, B.SC., Senior Principal Scientific Officer at the Royal Aircraft Establishment, Farnborough, to be given at Aslib at 5.30 for 6 p.m. on Wednesday 19th September.

The speaker describes himself as 'a sort of mathematical technologist'. Throughout last year and part of this, he was 'Visiting Research Professor' at the School of Library Science, Western Reserve University, Cleveland, Ohio.

The speaker's general aim was research into the formal foundations of documentation. At the present state of the art, theory is best derived from practice. Therefore, whilst working at the Western Reserve University Documentation Center, the speaker travelled some fifteen thousand miles within the USA, visiting installations, conferences, establishments, and individuals whose interests ranged from computors to 'traditional' library work. His talk will not deal primarily with practical or theoretical techniques, or evaluate methods. Rather it will discuss the changing shape of documentary activities; in particular the difference between American and British methods of coping with this change. He will give what he calls his 'far from humble' opinions on what might be done—as is usual with, and expected of, prophets returned to their own country.

Course on Cataloguing and Bibliographical References

The accurate and unambiguous description of publications is an essential link in the dissemination of information. An understanding of this art is important not only to those who compile catalogues and bibliographies, but also to those who have to give references to other publications in reporting their own work and those who use catalogues to find publications they have seen referred to in other works.

To meet the needs of such people Mr Jack Bird, M.A., F.L.A., will be giving a series of nine lectures entitled 'Giving references in catalogues, bibliographies, and scientific papers' on Wednesday evenings from 17th October to 12th December from 6.30 to 7.30 p.m. at Aslib headquarters. He will be discussing the principles on which bibliographical description should be based rather than teaching a set of rules, and will take account of the important recent developments at the international level. Mr Bird has served for many years on the British Standards Institution's committee on Bibliographical References, and recently represented the BSI at the conference of the International Organization for Standardization which drew up the international recommendations for bibliographical references.

The fee for the course will be 8 guineas. Those interested should write to the Education Officer, Aslib, for a descriptive leaflet and application form.

Midlands Branch

The Branch has arranged meetings for the coming months with the following speakers: Monday 1st October, Mr D. Bullivant on 'The SfB system of filing and the standardization of documents'; Tuesday 4th December, Mr J. R. Davies on 'Punched cards in library routine'; Wednesday 6th February 1963, Mr J. C. Coates on 'The British Technology Index'. The Annual General Meeting will be held on Monday 25th March 1963, when Mr R. Sheldon of the National Institute for Research in Nuclear Science, Harwell, will deliver a paper on information retrieval. All these meetings will be held at 6.30 p.m. at the Birmingham Engineering and Building Centre.

The 'summer meeting' will take place on 23rd April 1963 at the Lanchester College of Technology, Coventry. In the morning Mr T. H. Harden and Mr D. Parish will give a paper on the assessment of information system requirements, and after lunch at the College a visit will be paid to the Massey-Ferguson plant.

Chemical Group

A joint meeting of the Chemical Group and the London Section of the Society of Chemical Industry has been arranged for Tuesday 16th October 1962. Dr G. M. Dyson, Research Director of the Chemical Abstracts Service, will speak on 'Research at Chemical Abstracts'. Further details will be announced in the September issue of *Aslib Proceedings*.

Furniture Group

The Annual General Meeting of the Group was held on 5th July. Mr W. H. C. Moreton, Borough Librarian, Shoreditch Public Libraries, was elected Chairman in place of Mr B. Agard Evans, Ministry of Works Library, whose coming tour of duty abroad unfortunately prevents him from holding office. Mr G. L. Harding, Shoreditch Public Libraries, Central Library, Pitfield Street, London N1, was elected Hon. Secretary in place of Mrs I. Wagner, who resigned in December 1961 and has now left the field of furniture. Mr L. J. Mayes, Borough Librarian, High Wycombe Public Libraries, was re-elected Hon. Treasurer. Mrs Wagner and Mr Agard Evans had served the Group since its inception under Aslib's aegis and tributes to their work were paid by members.

The decision to extend the scope of the Group to include furnishings in addition to furniture should prove interesting and was the subject of much comment at the meeting. The Group exists to discuss problems of mutual interest in the documentation of furniture, and to co-operate in the lending of information and literature between members. New members are welcome and librarians and information officers interested should write to the Secretary. Useful projects have been undertaken despite the small number of members, and future plans include a new edition of the Group's union list of furniture periodicals and examination of the possibility of organizing a Furniture Group information service and publishing a furniture·book list. The Group proposes to issue a catalogue of books on furniture, compilation of which is already well in hand. It is intended to include the holdings of any library which may have a collection of books on furniture and not merely restrict the list to members. Librarians who have not already been contacted and who wish to have their library's holding on furniture listed should write to the editor, Mr F. C. Adey, Librarian, Leicester Colleges of Art and Technology, Leicester, as soon as possible and not later than 13th September 1962. On that date a meeting will be held at 3.30 p.m. at Aslib. One of the main items of business will be to discuss the scope and detailed policies regarding the catalogue. All interested are cordially invited to attend.

Anthony Thompson

Mr Anthony Thompson has been appointed Secretary of the International Federation of Library Associations as from 1st January 1963. Mr Thompson is well known to members of Aslib and warm congratulations are offered to him. He has served on the Aslib Education Committee and from 1960 to 1962 was a member of the International Relations Committee. Mr Thompson has given courses at Aslib on handling Russian and East European publications and, for the past ten years, has lectured on special librarianship at the North-Western Polytechnic. In January 1960 he visited the USSR as Aslib's nominee on an exchange visit of librarians. He is a contributor to the *Journal of Documentation* and the compiler of *Vocabularium bibliothecarii* (1953). He is now preparing a *Vocabularium documentationis*—a vocabulary of documentation terms in five languages—and his working paper will be presented at the conference of the International Federation for Documentation in Scheveningen, Netherlands, in September 1962.

Course on Presentation of Information

An evening course covering the Library Association syllabus in the Presentation and Dissemination of Information will commence at the North-Western Polytechnic, London, on Tuesday 25th September 1962, in preparation for the June 1963 examinations. It is hoped that the course will also be of general interest and value to librarians and information officers whose work demands a knowledge of the subjects to be covered. Further information may be obtained from the Department of Librarianship, North-Western Polytechnic, Prince of Wales Road, London NW5.

Course in Indexing

A course of eleven weekly lectures on indexing has been arranged by the Society of Indexers in collaboration with the North-Western Polytechnic, starting on Friday 28th September. Lectures will be held at the Polytechnic from 6.30 to 8 p.m., including a period for questions and, where possible, some practical work. The fee for the complete course is 25*s*, 3*s* for individual lectures. Those wishing to attend should apply to Mr G. Norman Knight, 3 Western Mansions, Western Parade, Barnet, Herts, not later than 10th September.

Medical Libraries Congress

The second international congress on medical librarianship is to be held under the auspices of the Medical Library Association in Washington DC from 16th to 22nd June 1963. The theme of the congress is 'Libraries in the advancement of medicine'. Inquiries should be addressed to the Executive Secretary, Second International Congress on Medical Librarianship, National Library of Medicine, Bethesda 14, Maryland, USA.

New Centre for Information Sciences

A Centre for Information Sciences has been established at Lehigh University, Bethlehem, Pennsylvania, USA. This is the third inter-departmental laboratory for research and instruction to be formed at Lehigh in as many months. The new centre, a division of the university library, will be directed by Mr R. S. Taylor, Associate Librarian. The centre is stated to have three main purposes: inter-departmental research in the information sciences, an inter-disciplinary programme of instruction at the graduate level, and the development and operation of selected substantive information centres.

Patent Office Index

The Patent Office has completed the preparation of a running index of patent specifications under current classification marks, and can now supply a list of specifications published in the last fifty years under any particular classification. Inquiries should be addressed to the Patent Office.

Translations of Foreign Standards

Aslib has recently been asked by one or two members to extend the Commonwealth Index of Scientific Translations to include specifically translations of foreign standards. The Index already includes some standards simply because they happen to have been notified, but no attempt has been made to collect details of translated standards systematically.

It is thought that this matter is primarily one for the British Standards Institution, which already holds a number of translations, some of them issued by the foreign standards organizations. The BSI has agreed to compile a full list of the translated standards which it holds and asks firms to deposit copies of their translations with BSI or, alternatively, to lodge with BSI details of translations which they have available for loan. It is hoped that member organizations of Aslib will collaborate in this useful undertaking.

Foreign Language Barrier

The foreign language barrier in science and technology, a study based upon three investigations carried out in the Aslib Research Department, is to be published early in September. The nature and extent of the foreign language barrier as it affects English-speaking scientists and engineers is reviewed and the potentialities of three ways of surmounting or lowering it are examined: teaching scientists to read foreign languages; cover-to-cover translations; co-operative indexes and pools of unpublished translations. The text includes tables and diagrams showing results achieved by three 'Russian for Scientists' courses, and the time taken by students to obtain a useful reading knowledge; a list of 317 foreign language journals from which articles have been translated most frequently (as judged by entries in the Commonwealth Index); and the numbers of translations of articles made, and requested, by language and date.

The foreign language barrier in science and technology provides evidence relevant to Dr J. E. Holmstrom's paper with the same title to be given at the Aslib Annual Conference in October. It will be available from Aslib, price 12*s*; an order form is enclosed with this issue.

New Library Journal

A new quarterly, *Herald of Library Science,* has been started under the auspices of the Sarada Ranganathan Endowment for Library Science. Shri Prithvi Nath Kaula, the Editor, hopes to produce a journal which is neither too theoretical nor too ephemeral in content, and intends to encourage young librarians to publish their views on professional subjects. Volume 1, number 1 was published in January, and subsequent issues are to be published in April, July, and October. Subscriptions, at 25*s* a year, should be sent to Herald of Library Science, C 1 Banaras Hindu University, Varanasi 5, India.

Public Record Office Reprints

HM Stationery Office has granted permission to the Kraus Reprint Corporation to reproduce two series of Public Record Office publications which, for the most part, have been out of print for a long time. Kraus will be reprinting the original texts of all ninety-nine titles in the Rolls series *Rerum Britannicarum medii aevi scriptores*. They will reprint the Public Record Office lists and indexes (all at present out of print) by photolitho. Manuscript amendments will be included, bringing these scholarly reference tools up to date. Supplementary volumes of hitherto unpublished lists will be issued in the same series.

All United Kingdom sales will be handled by HM Stationery Office.

Serials in the National Library of Medicine

Nearly 9,000 periodicals received between 1950 and 1960 at the National Library of Medicine, Washington DC, are listed in *Biomedical serials 1950–1960 a selective list of serials in the National Library of Medicine*, compiled by L. M. Spanier and published by the Public Health Service of the US Department of Health, Education, and Welfare.

The title arrangement is explained in detail in an introduction and each entry shows the date and volume with which the library's file began. Changes of title and non-vernacular summaries or contributions are noted. As a reference list of medical titles this has many advantages over *World medical periodicals*, and medical and pharmaceutical librarians will find it worth purchase. *Biomedical serials 1950–1960* is for sale by the Superintendent of Documents, US Government Printing Office, Washington 25, DC, price $3.

CONFERENCE ON CLASSIFICATION

Attendance List

BAMBROUGH, J. R., St John's College, Cambridge.
BOYCE, A. J., Department of Zoology, University Museum, Oxford.
BURNABY, DR T. P., Department of Geology, University of South Staffs.
CAMPBELL, DR D. J., Pressed Steel Co. Ltd, Oxford (Member of Classification Research Group).
CLEVERDON, C. W., College of Aeronautics Library, Cranfield (Member of Classification Research Group).
CRAWSHAY-WILLIAMS, R., philosopher, Penrhyndeudraeth, Merioneth.
CURREY, J., Department of Paleontology, University Museum, Oxford.
DOLL, DR R., Medical Research Council Statistical Research Unit, London School of Hygiene and Tropical Medicine.
DYSON, DR G. M., chemical engineering and scientific documentation, Loughborough.
EVANS, B. AGARD, O.B.E., Ministry of Works Library (Chairman, Aslib Conferences and Meetings Committee).
FARRADANE, J. E. L., information scientist.
FORTES, PROF. M., William Wyse Professor of Social Anthropology, King's College, Cambridge.
GLENTWORTH, DR R., Macaulay Institute for Soil Research, Aberdeen.
HEALY, M. J. R., Soil Survey of England and Wales, Rothamsted.
HEIM, DR ALICE, intelligence tests, Cambridge.
HEYWOOD, DR V., Botanical Laboratory, University of Liverpool.
HOLLOWAY, A. H., Admiralty Centre for Scientific Information and Liaison (Deputy Chairman, Aslib Conferences and Meetings Committee).
JOLLEY, J. L., J. L. Jolley & Partners Ltd, High Wycombe.
KENNARD, MRS O., National Institute for Medical Research, London.
MILLS, J., North-Western Polytechnic, London (Member of Classification Research Group).
MILNER, G. B., School of Oriental and African Studies, University of London.
NEEDHAM, DR R. M., Language Research Unit, Cambridge.
OSMUND, DR D. A., Soil Survey of England and Wales, Rothamsted.
PALMER, B. I., Library Association (Member of Classification Research Group).
PARKER-RHODES, DR A. F., Language Research Unit, Cambridge.
PERRING, DR F., University Botanic Garden, Cambridge.
ROBINS, R. H., School of Oriental and African Studies, University of London.
SILVESTRI, PROF. L., Istituto di Microbiologia, University of Milan.
SKELLAM, J. G., Nature Conservancy, London.
SMART, DR J., Museum of Zoology, Cambridge.
SPICER, DR C., Imperial Cancer Research Laboratories, London.
STEARN, DR W. T., Department of Botany, British Museum (Natural History).
SYLVESTER-BRADLEY, DR P. C., Department of Geology, University of Leicester.
WHITEHEAD, DR F. H., Department of Botany, Imperial College of Science and Technology, University of London.
WILSON, L. W., Director, Aslib.

CLASSIFICATION : AN INTERDISCIPLINARY PROBLEM

Proceedings of an Aslib Conference

London, 6th April 1962

Chairman BARBARA R.F.KYLE

Assistant Director, The National Book League

THE Chairman welcomed delegates on behalf of Aslib. She recalled that at the international conference on classification held some years before at Dorking, there had been a permanent air of intellectual euphoria. Nobody had gone to bed. If as much interest were aroused on this occasion, delegates must remember that they could not do in two or three hours what had proved impossible to do in a week, including nights, at Dorking. Dorking had been a particularly fruitful conference. Some of the members, writing on classification afterwards, wrote '*après* Dorking'. She did not know whether they would also say '*après* Belgravia'.

The intention was to discover what they could contribute to each other in their many common problems. Non-scientists reading the scientific journals recently had come to the conclusion that the subject was not quite as simple even in botany and biology as they had thought. At least one taxonomist had defined species as 'an assemblage of animals recognized as a species by a competent taxonomist'! She hoped that they could go beyond that.

People were present from specialized subject fields and from the documentation profession. Together they might achieve much.

INTRODUCTION

MR J. S. L. GILMOUR, M.A., F.L.S., Director, University Botanic Garden, Cambridge, in his introductory paper said that it might be useful to launch the symposium with a brief reference to what certain philosophers had said about classification in general, as a background to the later consideration of particular problems in particular fields of classification. Much that he would say would be familiar to many of the audience, but it might be worthwhile having it presented at the beginning in order to keep it in mind during the discussion. There were two or three professional philosophers in the audience who would know more about the subject than he did. No doubt they would expand on what he said or correct it during the discussion.

The four main nineteenth-century philosophers who had written on classification were Mill, Whewell, Jevons, and Venn and, as far as his limited reading had gone, most other philosophers who had written on classification had said roughly the same thing.

He wished to make three points, taken from the writings of these philosophers.

The first, and perhaps the most important, was that classification was regarded by these philosophers as one of the main elements in man's use of language and as such was one of the basic human tools for dealing with the world around him. Many of the philosophers pointed out that when one said 'chair' and 'table', the mere use of those words automatically classified everything in the world into chairs and non-chairs, and tables and non-tables. They further pointed out that if one did not have this device of classification, and had to use an individual word for every object, communication would be intolerably cumbersome and slow. Instead of saying, 'Bring me that chair', one would say, 'Do what you did yesterday with the object which we called Jimmy'. In that event one probably would not get what one wanted.

Two subsidiary points flowed from this first main point. First, classification was not an end in itself but was a means to an end, just as was language itself. This had been very much stressed by Mr R. Crawshay-Williams in two of his books. He was present at the conference, and it was hoped that he would expand on the subject later. Secondly, this use of the word 'classification' by philosophers was a much wider use than that normally adopted by people who were classifying in actual disciplines. People sometimes said, 'I suppose that we must abandon classification and go back to an alphabetical arrangement'. According to the philosophers, the use of an alphabetical arrangement was just as much a classification as any other arrangement. It was helpful to employ this wide use of the term because it emphasized the likenesses and the differences in aims and purposes between different arrangements rather more than if one drew a line between kinds of arrangement and said that some were classifications and others were not.

The second main point followed from the first: that if classifications were a means to an end, obviously the classification employed must vary with the end in view. This could be summed up in the slogan 'different classifications have different purposes'. It followed that there was no ideal classification which was suitable for all purposes. There must be a particular classification for a particular purpose. An obvious example was in the classification of human beings. There was no one ideal classification suitable for all purposes. If one were interested in what human beings did, one would classify them in professions. If one were interested in where they were born or lived, one would classify them in nationalities. It made no sense to ask which was the better classification of the two. The question must be, better for which purpose? Much of our humour was bound up with using an unexpected classification. For example, there was the man in the Thornton Wilder play who introduced a lady at a reception with the words, 'I know that our visitors will wish to hear a word from that gracious and charming mammal, Mrs Antrobus, wife and mother—Mrs Antrobus!' Undoubtedly Mrs Antrobus was a mammal, but it was perhaps not a particularly expected description of her in that context!

The third main point was that philosophers distinguished between two broad types of classification; these merged into one another, although they were fairly distinct at the extremes. The two types had been called by various pairs of terms. Examples were 'natural and artificial', 'scientific and non-scientific', and 'general purpose and special purpose'.

The essential distinction between these two types in their extreme forms was that the objects classified in a natural classification showed a likeness in a large number of attributes whereas those classified under an artificial classification showed a likeness in only a small number of attributes, possibly only one. The classification of books under authors was a natural classification, but their classification according to the colour of their binding was an artificial classification. A classification under authors, for instance, grouped together books broadly of the same subject, date, etc., whereas the colour of the binding of the book had probably no other attribute correlated with it.

There were two rather important subsidiary points arising here; the first was the question of purpose. This linked with the third pair of terms often used for these two types of classification: general purpose and special purpose. One could broadly say that a natural classification served many more purposes than did an artificial classification. For example, to say that a book was by Dickens was a useful classification for many purposes, such as deciding whether one would enjoy it, whether it was fit to be presented to Aunt Mary, whether it was likely to be humorous and so on. To say that it had a red binding had probably no purpose other than deciding where it should go on a shelf in a drawing-room which you wanted to look pleasant.

The second subsidiary point was that philosophers had distinguished two different methods of classification. Again, these merged, but at the extremes they were fairly distinct. One might call these two methods the typological method, which was linked with a natural classification, and the definitional method, which was linked with an artificial classification.

The definitional classification in its extreme form consisted of consciously selecting one or perhaps two attributes and defining the groups as all the objects which showed these attributes. An example of this was in the law, where it was essential to be certain which attributes were meant when using a word such as 'murder' or 'theft'.

In its extreme form the typological method was entirely different. It was not a deliberate process, but one by which the classes gradually, and more or less unconsciously, grew up around a notional 'type'. Most of our common names, such as 'chair' and 'table', had arisen in this way. As distinct from the definitional method, there were not necessarily any attributes common to the whole class. This type of method led to what was called 'family resemblance'.

These two types of classification, and these methods which were linked with them, merged, and there was rarely a pure example of one or the other. What often happened was that a series of classes grew up by the typological method and then one tried to apply the definitional method to them. This was roughly what happened in biological genera and species.

He had been very brief and sketchy, but he hoped that what he had said had reminded some present of what philosophers had said about classification in general. He left one thought in conclusion: classification was not an end in itself, but always served some purpose outside itself.

ZOOLOGICAL CLASSIFICATION

A. J. CAIN, M.A., D.PHIL., F.L.S.
Department of Zoology and Comparative Anatomy, Oxford

LIVING organisms are immensely complicated things, most of which (except the minutest) present at a glance a vast variety of structural and other characters that can be considered from many aspects. The analogy between animals and writings would seem to be clear, and the necessity for co-ordinate classification equally great for both. Certainly, many different sorts of classification are used for animals and their parts, in relation to their genetics, development, functions in the widest sense, distribution, ecology, and evolution. Yet there is one principal classification which bears the principal reference system, and co-ordinate classification is only subsidiary.

It has long been known empirically that at least as far as structure is concerned animals tend to cluster into a definite number of great groups; that however they may differ superficially, nevertheless almost all of them can be assigned to one or other of these groups; and that provided a sufficient number of characters is considered, the assignment on these characters will be supported by the examination of further characters. A whale is a (highly modified) mammal not only because it produces milk from mammary glands, but also because of the characters of its skeleton, it circulation, its excretory system, its mode of reproduction, its embryonic characters, and so on. Cuvier went so far as to say that there were only a few major plans of construction in animals, and the differences between animals of the same plan, however naturalists might like to dignify them by resounding rank-names, were really rather trivial. Allowing for the fact that he recognized only four main plans, and that one of these required breaking up into about fourteen different ones, he was, broadly speaking, right. But when we come to break up the major groups, we sometimes meet difficulties, and when we come down to minor ones, we may be faced with an almost reticulate pattern of variation from form to form, which it is very difficult to break up into discrete groups on any satisfactory criteria.

The general observation that a hierarchical classification into groups is possible received its theoretical confirmation in the theory of evolution. If the production of new sorts is by gradual modification in many features of old ones, then a group of forms that resemble each other fundamentally (not merely superficially) will all be descendants from one ancestral form. The 'natural' thing to do will be to group them together since this will show what they 'really' are, namely modifications of one single type. In general, it will be true that any form will be most like its immediate ancestor and, in consequence, such a classification will demonstrate for us the actual course of evolution. It will therefore be the most useful, and for greatest efficiency the reference system should be based on it.

But there are several important difficulties that stand in the way. In the first place, we have only a very imperfect knowledge of most forms, and cannot hope, in the case of fossil groups, for it to improve very much. It may be a matter of guesswork, therefore, to reconstruct the course of evolution in any one group and to say what a given form 'really is' in evolutionary terms. Secondly, as knowledge does increase in some groups, we shall be faced with a continuous series of forms, not a number of highly discrete ones—the good species of Linnaeus—which can be used as units. This difficulty is now well known as a practical problem in animal taxonomy. Thirdly, and perhaps worst of all, the human eye and brain are far better at appreciating at a glance a vast number of characters than is the human hand at writing them all down and making them explicit. But the number of kinds of animal known is enormous and increasing daily, and the number of characters of each to be examined is, according to Mayr[11], limited only by the patience of the investigator. Moreover, the continual invention of new investigatory techniques (in serum technology for example) is always adding hosts of new ones of the greatest interest. The principal working taxonomists are museum workers trying to distinguish new forms, to revise old groups to bring them more into line with increasing knowledge, and, above all, to *identify* material for themselves and others. The immense number of new forms becoming known had a bad effect on taxonomic practice in Linnaeus's day[7] and that and the number of new characters together are having a bad effect now. The taxonomist is compelled to some rule of economy in his work, to devising classifications which bring him through the *minimum* number of stages to the group or form he wants, and to defining groups which require the *minimum* number of the most easily found characters for their identification. These requirements are often in full conflict with those of a classification based on a great variety of characters or an evolutionary classification. Lastly, such a heavy reliance on the speediest methods of working out groups, forms, and definitions means necessarily that very much taxonomy is done at a glance, and that the selection of characters is often, because not explicit, heavily biased by the experience of the particular taxonomist, the groups he has previously worked on (and those he has *not* worked on), his ideas about evolution, and occasionally sheer idiosyncracy.

If there were any method of analysing animals so that the construction and behaviour of each could be shown to follow from a few great principles, then ideally each form could be expressed in terms of these principles in such a way as to define it and its properties completely. Something of this sort has happened in the classification of the elements by their atomic structure. Such a taxonomy of analysed entities has been attempted many times. In Linnaeus's period and before, logical analysis, plus Aristotelian physiology, was thought to help in this[4]. About the beginning of the nineteenth century, physiological criteria of what must be the most important characters were widely used[5]. But in both periods there was far too little information for any such analytical taxonomy to be attempted, and workers were in fact arguing in a circle from the observed constancy of certain characters in already recognized 'natural' groups' to their physiological importance. Darwin rightly rejected such attempts, but he tried to recognize which characters were more likely to remain constant during evolution and to use them as the best indicators of ancestry—and his criterion again, in the absence of a really good fossil record, could only be constancy within 'natural groups'[5, 6, 7, 8, 10]. In fact, if all we have is a number of living forms which are closely related in structure, we may well believe that they are all descended from a common ancestor. But one of them may be that ancestor still persisting; or the whole group may have diverged from something very like the generalized form we can obtain by neglecting all characters peculiar to only one or a few of the extant forms; or the common ancestor may have been right outside the group as it exists today—or indeed some members of it may have acquired their resemblances by convergence and the group is really polyphyletic. We just don't know.

Convergence is a well-established evolutionary phenomenon. Different stocks of animal, given the opportunity, may take up very similar modes of life and may then come to resemble each other to a quite extraordinary degree. Parasites are an obvious example—some internal parasites in the sea are helminths, others copepod crustacea, others gastropod molluscs and so on, but some of these resemble one another more than they do the free-living members of their own groups. In South America, while it was an island continent, marsupials and true mammals radiated to fill nearly all the niches occupied by true mammals in the northern world; perhaps their best efforts were a one-toed horse and a marsupial sabre-toothed tiger. Such striking examples as these are well known—Darwin mentioned the whale, dugong and bony fishes, the mouse and shrew, and so forth. But these are the examples in which we can see, in other characters, that convergence has occurred. It is true that very distantly related forms are unlikely to converge completely, but when we have two related stocks, it is far easier for them to converge (usually in different regions of the earth). In this case, part of the resemblance of their descendants will be ancestral, and part will be convergent—and we may be unable in the absence of a good fossil record not merely to separate the convergent from the ancestral characters but even to recognize that convergence has occurred. This difficulty was never discussed by Darwin[5, 6] and has only recently received the attention it deserves[1,10].

Taxonomists have in the past been so anxious to justify their procedures on whatever theory was fashionable that they have often mistaken their own actions or committed unjustifiable ones. The reason for this is thoroughly respectable, indeed laudable; they were wanting to do the best they could, to produce classifications based on what animals 'really are'. In the eighteenth century the prestige of deductive reasoning led them to reject the empirical approach of Adanson[5]; in the nineteenth and twentieth the respect commanded by evolutionary theory has again led them to reject empirical methods, while in both centuries the enormous amount of material to be got through has compelled them to work with as few explicit characters as possible. But the result has often been that different people have had very different opinions on what must have been primitive in a given group, and have arranged it very differently with consequent disturbance to the nomenclature. Some revisions, of course, have been based on additional information and have been real improvements, but others have not. I might instance the vicissitudes of the Oligochaeta (earthworms and allied forms). In early days one started with *Lumbricus* as most complicated and therefore the most perfect example, and worked down to the simple ones. Then under the spell of evolution, one started with the simplest, *Aeolosoma*, as primitive and worked up. More recently under the influence of Michaelsen and Stephenson one starts from about the middle, *Lumbriculus* or thereabouts, and works from there in several directions. Michaelsen's latest classification uses such terms as Archioligochaeta and Neooligochaeta and looks very scientific and evolutionary, and has been widely accepted, especially in the USA. But there is really no basis at all for an evolutionary classification of the major groups within the class, and an old grouping into Microdriles (small, rather simple forms), Megadriles (large and complex—earthworms) and Discodriles (some leech-like ectoparasites) is infinitely preferable as being useful and comparatively free from tendentiousness. Other groups have suffered far worse; in some, an expert in the group can see that a recent reviewer has worked on principles which he has never discussed, and may even not know clearly himself[8].

Many groups at the present day, therefore, are arranged on a curious mixture of doubtful 'evolutionary' principles and procedures which produce easily defined groups primarily for purposes of identification. These lead to the splitting of groups on an easily seen and stated character, although on all other characters known no such separation should be made.

Lastly, there is a further complication. In Linnaeus's day there was a good theoretical unit, the species, and when his own theory of taxonomy was finally abandoned[3, 4, 5, 6, 7] it was still possible to think of all higher groups as being collections of species brought together on their general resemblances. Now, such a pleasant uniformity has gone for good[11] (*see* [2] for a general account). Some species are interbreeding populations evolving by themselves without genetic contributions from other forms—these in animals correspond to the good species of Linnaeus in some ways. Others are agamic; each individual has only one parent and the criteria of interbreeding cannot be applied. Others are arbitrary chunks cut out of a single evolutionary line. All have to be fitted into a single scheme of classification.

Moreover, the standard system of nomenclature, the binomial nomenclature derived from Linnaeus, was part of a system carefully designed to fit with Linnaeus's own theory of taxonomy, in which the genus was at least as important practically as the species. At present[3] our only approach to a unit is the species in some of its forms, and all groups above it are only collections of species, brought together on their overall affinities. Yet a species cannot be named without it being assigned to a genus. The advantages of an internationally agreed nomenclature with rules for synonymy and homonymy and for valid publication are so great that few would wish for any change—yet the nomenclature is strictly speaking no longer appropriate except by accident.

One healthy sign is the adoption by several groups of taxonomists independently of procedures which can give some reasonably objective estimate of overall resemblance. But the time required for assembling the data which these procedures require remains very great, and there is no doubt that the traditional taxonomy-at-a-glance will continue to operate and be the principal taxonomic procedure. The necessity for distinguishing between classifications purely for identifying (keys), classifications that store the greatest information about their subjects ('natural' or phenetic classifications), and classifications that attempt for imperfectly known groups to guess at the course of evolution, is still not fully appreciated.

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BOTANICAL CLASSIFICATION

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LIKE the classification of animals, botanical classification was formalized by Linnaeus against a background of Aristotelian philosophy and logic. The hierarchical system, with a Latin binomial nomenclature for the unit of the *species,* has provided for the main purposes of botanical science a reasonably stable reference system in an international language, by means of which information, ideas, and generalizations about plants can be communicated.

Linnaeus was largely concerned with the description and identification of 'kinds' of plants. Without the ordered system of classification and nomenclature which he provided, the wealth of plants and animals new to science which were coming from the voyages of exploration could not have been dealt with in the late eighteenth and early nineteenth centuries. Inevitably there grew up a tradition of Linnaean taxonomy and a more or less standardized procedure, which flourished in the nineteenth century largely in the hands of a 'professional' class of herbarium taxonomists.

The stability of the classification of the flowering plants (to which for obvious reasons the main attention of the early botanists was directed) can be readily appreciated by looking at de Jussieu's *Genera plantarum*[3]. Of the twenty largest families of flowering plants recognized by modern taxonomists, no fewer than eighteen are immediately indentifiable in this work, and half of these are named exactly as at the present day (e.g. *Cruciferae, Rosaceae,* and *Umbelliferae*). It is true to say that the majority of familiar north-west European genera of flowering plants can be found in Linnaeus's works, and the majority of familiar families into which these genera are grouped can be found in de Jussieu. In other words, the general shape of flowering plant taxonomy was laid down before the end of the eighteenth century in Europe.

The significance of this origin of botanical taxonomy seems to have been generally overlooked. It has been naïvely assumed by most taxonomists that stability is evidence of some essential 'correctness' of the natural classification of flowering plants, and this assumption has operated powerfully, as we shall see, in post-Darwinian botany. The inescapable conclusion of a study of the history of botanical taxonomy is that a 'natural' classification, based upon total resemblance in a variety of characters, has survived because it proves useful for the somewhat diverse general purposes of botany as a whole, not because of any great intrinsic merit in the particular natural classification which actually took shape. I have shown elsewhere[4] that our modern classification is heavily biased because it originated in Europe and was shaped with reference to European plants; if we were to start again, a new natural classification might well look very different, and in particular the size and circumscription of families and genera could be quite unfamiliar. Would the classification be any 'better' or 'worse'? Here the remarks made by Mr Gilmour are obviously relevant.

In the century since the publication of Darwin's *Origin of species* three factors have powerfully influenced writers on botanical taxonomy. First, there was Darwin's explanation of 'natural affinity' in classification in terms of common descent, which Dr Cain discussed in the context of zoological classification. As in zoology, post-Darwinian taxonomy in botany has been heavily infected with phylogenetic (evolutionary) speculation, and it is probably true to say that the majority of taxonomists still equate 'natural' with 'phylogenetic' classification, and envisage their natural classifications as gradually perfectable towards the 'ideal' classification which would faithfully reflect evolutionary history. I agree entirely with Mr Gilmour that it is essential to refute this view.

The second post-Darwinian factor influencing plant taxonomy is the growth of cyto-genetics and micro-evolutionary studies, producing the area of study variously called 'experimental taxonomy', 'biosystematics' or 'genecology'. These modern studies offer the possibility of objective criteria, such as inter-fertility, for the definition of groups. Here the tension is greatest at the level of the taxonomic species, the unit to which the binomial is attached. The desire to redefine the species in genetical terms is understandable; but the effect of trying to do so is to produce chaos in the general reference system (*cf.* Darlington[1]). For this reason, Gilmour and Gregor (*see* [2] for references) suggested a special terminology for micro-evolutionary studies in which it would be explicitly recognized that the categories of genus, species, etc., were general-purpose taxonomic ones, and the '. . . deme' terms were relatable to the general reference system. This seems an admirable, logical solution to a terminological difficulty which bedevils a good deal of biological writing.

The third factor affecting taxonomy is the most recent, and has as yet hardly begun to operate; it is, however, destined to have a profound effect. I refer to quantitative methods for estimating taxonomic relationship, now become 'practical politics' for the first time with modern data-processing machinery. This is Dr Sneath's field, and I am content to leave it to him today.

All these new factors cause tension and disagreement in botanical taxonomy because of the unresolved conflict of ideas in the logical and philosophical discussions of the nature and purpose of classification and in the meaning of 'relationship'. Is it meaningful to speak of an improved classification of plants (or of anything) unless there is agreement on the purpose (or the criteria of assessment)? Can the word 'relationship' be used unqualified without causing misunderstanding? In botanical taxonomy these unresolved difficulties produce many sterile arguments about whether this grouping of taxa is 'better' than that, or whether X is more closely related to Y than to Z.

So far I have confined my attention to the taxonomy of the higher plants, which is based today, as it was in Linnaeus's day, on the visible morphological characters of the individual. The taxonomy of micro-organisms (bacteria, viruses, etc.) is, however, in a quite different state. The history of biological science has forced it to develop inside a Linnaean framework, although practically all our knowledge of these groups is relatively recently acquired. It is not self-evident in the taxonomy of micro-organisms that a fixed general-purpose hierarchical classification with a Latin binomial nomenclature is what is needed; and it is, I think, significant that some of the most powerful questioning of the theory and philosophy of taxonomy has come from workers with micro-organisms whose 'traditional' taxonomy was so inadequate. It is relatively easy to justify an unthinking traditional approach to classification in the higher organisms where, as we have seen, a natural classification is generally workable and commands general assent; but the absence of agreement as to what constitutes a 'character' and the obvious dependence of this choice on the particular interest of the investigator, have brought the microbiologist to face issues of fundamental importance in classification. I hope that we shall have an opportunity to discuss these today.

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CLASSIFICATION OF SOILS

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FROM the first emergence of civilizations based on agriculture, variations in the nature and productive capacity of the soil were recognized by farmers, and names, usually based on colour or texture, were given to distinctive varieties. In modern times the connection between soils and the rocks which provide their parent materials was generally recognized, and the earliest attempts to classify soils systematically had a geological or petrological basis. Most of these schemes, such as those proposed by Thaer and Fallou in Germany, suffered from their limited geographical scope, and little attention was paid to the effects on soil formation of climate, vegetation, and topography. Soil was conceived primarily as an inert material composed of variously constituted mineral particles mixed with varying quantities of plant residues, and the accent on soil as a material received further emphasis following the publication in 1840 of Liebig's 'Chemistry in its Application to Agriculture and Physiology', which suggested that differences in soil fertility were largely determined by differences in chemical constitution.

About 1870, a new concept was introduced and developed by Russian investigators, led by Dokuchaiev. Soils, in their view, should be considered as independent natural bodies, each with a definite morphological organization expressed in the development of distinctive horizons (or layers) roughly parallel to the surface. These horizons (together constituting the soil profile) resulted from the progressive transformation of the parent rock-materials through the continual interaction of various soil-forming or pedogenic processes, including chemical and biochemical weathering, breakdown of organic residues through the agency of soil-inhabiting organisms, and translocation of dissolved or finely dispersed alteration products by soil-water movements. The soil-forming processes were conditioned in turn by environmental factors, including climate, vegetation, and relief which, together with the character of the parent material and the age of the ground surface, determined the type of profile at any particular place. Soils, according to the Russian concept, were dynamic, not static bodies, evolving with time to reach a condition of equilibrium which was primarily dependent on climate and physiography and corresponded to a particular vegetational climax. A distinction was thus drawn between 'mature' soils, with well-developed horizons reflecting the influence of climate and vegetation, and 'immature' soils with weakly-developed horizons differing little from the original material. On this basis, Sibertsiev, a pupil of Dokuchaiev, distinguished three broad groups of zonal, intrazonal, and azonal soils.

1. *Zonal soils.* Mature soils with salient profile characteristics reflecting the influence of regional climate and vegetation (*e.g.* podzolic soils of the Taiga; chernozem, chestnut and sierozem soils of the steppes and desert-steppes).

2. *Intrazonal soils.* Mature soils whose profile characters differ from those of associated zonal soils through the operation of local physiographic factors such as poor drainage (gley, saline, and peaty soils) or parent materials resistant to zonal processes (*e.g.* rendzinas).
3. *Azonal soils.* Immature soils developed in freshly deposited sediments or on ground-surfaces newly exposed by erosion.

On the Russian plains these divisions were expressed geographically in the distribution of major types of soil in belts corresponding to the major climatic and vegetational zones, each containing local areas of intrazonal and azonal soils.

The revolutionary ideas of Dokuchaiev and his school stimulated the study of soils in the field, first in Russia and later in America and Western Europe, and led to the development of numerous systems of classification based on the evolution of the soil profile in relation to environmental factors. Outside Russia most progress was made in America, where knowledge of soils was extended by the early initiation of detailed surveys and where, in 1927, Marbut was among the first to propose a multicategorical system of classification designed to include all soils already known. Marbut's scheme was later revised and elaborated by Kellogg and others[9]. In the form finally taken by this scheme the highest category (order) is represented by classes of zonal, intrazonal, and azonal soils on the Russian model. Below these are sub-orders, representing broad groups of soils with common characteristics related to the conditions of their formation, and these are in turn divided into great soil groups (corresponding to the Russian genetic soil types), each characterized by profiles with the same kind and arrangement of horizons. Successively lower categories are referred to as soil families, soil series, and soil types. These are differentiated chiefly on the basis of profile features (such as texture, colour, mineralogical constitution, and degree of horizon development) reflecting local differences in parent material and hydrologic conditions, and are the units shown on detailed soil maps made primarily as an aid to land use. The soil series, which have geographic names (*e.g.* Miami series), are allowed only a narrow range in subsoil characteristics, but minor variations in surface texture are included, and these are distinguished as soil types (*e.g.* Miami silt loam).

By 1939 comparable systems of classification were in use wherever soil surveys were being carried out, but whereas workers in Britain and most Commonwealth countries adopted the American soil series and types as basic units of classification, in Russia, and in Europe generally, lower categories, in so far as they were recognized, were given connotative names (often very unwieldy) indicating their status as subdivisions of major soil groups or 'genetic soil types'.

As knowledge of soils and their relationships was extended, it became apparent that the various so-called 'genetico-geographical' systems of classification that had been proposed were subject to several major defects, the chief of which was the vague definition of classes in the higher categories. Although the systems were informed by similar principles, and similar names (*e.g.* podzol, chernozem) were used for many of the classes recognized, the names often carried widely varying connotations in different countries and the resulting confusion in nomenclature was such as to engender despair among those seeking a uniform basis for organizing and using the rapidly increasing volume of information on the properties, behaviour, and utilization of particular soils.

Undoubtedly among the chief causes of confusion was the manner in which the categories were defined. Although Dokuchaiev himself stressed in connection with his first classification that 'grouping of the soils should always be based on the sum of existing characters of a given body', it was in fact often the case (*cf.* American classification) that class-identification was largely dependent on inferred correlations between profile characters, genetic processes, and contemporary environmental factors. In the then current state of knowledge such identifications were inevitably subject to wide differences in interpretation, especially when applied in conditions unlike those of the regions where the concepts were originally developed. Moreover, although it was recognized that soil differences could generally be attributed to variations in one or other of Dokuchaiev's five factors of soil formation, it became apparent that the role of climate had been over-emphasized to the serious neglect of parent-material and geomorphic factors. Whereas the concept of zonality appeared eminently reasonable when applied to continental plains covered by pleistocene deposits of relatively uniform lithology and age, its value as a general basis for classification was seriously questioned once attempts were made to apply it in unglaciated landscapes composed of varied rocks and land-forms.

More fundamental objections to the classical 'genetico-geographical' approach arose from realization *a*, that the effect of a particular factor on the course of soil formation is dependent on the status of the others, with the result that morphologically similar soils may originate through the operation of different constellations of factors; and *b*, that owing to periodic changes in the environment (*e.g.* pleistocene and post-pleistocene climatic changes), soils associated with all but the youngest ground surfaces may have originated under conditions unlike those of the contemporary landscape.

Another general defect of the earlier genetic systems is that little account was taken of soils whose characteristics had been profoundly modified as a result of man's use of the land. Definitions of the classes were based primarily on features apparent under natural or semi-natural vegetation, and cultivated soils were either ignored or classified on the basis of properties that they were presumed to have had when virgin.

Except in Russia, where current trends in soil taxonomy remain dominated by the traditional geographic-evolutionary approach, appreciation of the shortcomings of previous schemes has led to a general reaction in favour of descriptive systems, with categories defined in terms of intrinsic properties rather than in terms of inferred genetic factors or processes. The most extreme advocate of this approach is Leeper[6], who favours the adoption of an admittedly artificial system based on the selection as differentiating criteria of a small number of definite and measurable properties of the profile without regard to genetic considerations. This proposal has, however, gained only limited acceptance, and most soil taxonomists in western countries are now concerned with the formulation of what may be called 'morpho-genetic' systems, informed by two chief guiding principles[3, 8].

1. Classes in all categories are defined in terms of measurable soil properties

(including features such as average temperature and seasonal moisture regime) which are either a reflection of genesis, or effect the evolution of the soil.

2. Since it is recognized that no one character or group of characters is equally significant in all soils, the characters chosen as criteria are variable within each category, the aim being to attain the most harmonious and useful grouping.

In practice the chief criteria used are differences in the nature and arrangement of horizons in the profile, in water relationships, and in easily determined physical, chemical, and mineralogical properties; and more attention is paid to texture and other properties inherited from the parent material than in the earlier systems.

Of several recently proposed schemes of this type, the most comprehensive has been developed by way of successive approximations by G. D. Smith[8]. This scheme, intended to replace the earlier American system to which I have already referred, incorporates a completely new nomenclature and represents an extremely painstaking attempt to devise precise definitions of classes without departing to any great extent from the older concepts. As a result it seems likely to prove excessively complicated and difficult to use.

Other less complete and more typological schemes have been proposed in western Europe by Kubiena[5] and by Aubert and Duchaufour.[1] These use existing class names where possible, new names being coined only for classes not previously recognized. Beneath the differences in nomenclature these three schemes reflect a gratifying convergence in views, but none of them seems likely to command general acceptance without modification.

The failure of soil scientists to produce a generally acceptable classification appears to stem partly from their attempts to apply the methods of biological taxonomy to systems which vary continuously both in space and in time. Thus, although soils do not exist as discrete individuals, and although intergradation between kinds of soil is normal rather than exceptional, many pedologists attempt to conceive the soil mantle as a population of individuals, each with more or less arbitrary boundaries, and seek to formulate a hierarchical system of classification by discovering differentiating characteristics which will group classes of individuals into successively higher categories. Yet it may be more realistic, as suggested by Gleason[4] in respect of plant communities, to approach the problem of classification by attempting to establish in the soil continuum abstract points of reference, or *noda*, each corresponding to complexes of characteristics which are repeated frequently in nature with little variation. Also, as pointed out by Crowther[2], a hierarchical system is difficult to apply to soils because, since their characteristics result from the interaction of a variety of factors, a system designed to portray their interrelationships would need to be multidimensional.

Pettijohn[7], discussing the classification of sedimentary rocks, states that 'a good descriptive classification must utilize genetically significant properties'. But before one can agree on whether a particular type of classification is good or bad, one must first agree on the purpose of the classification. So far as soils are concerned, it is clear that, whereas no one classification could possibly meet the specialist needs of agriculturalists, road engineers, and land-use planners, to name only a few possible users, there is a real need for a single universal classification *a*, as a means of communication between scientists and technologists working with soils or in allied fields; and *b*, as a basis for organizing knowledge about the use and behaviour of soils, particularly through soil maps. To serve the first purpose, the main requirement is that class identification should be based on observable or measurable properties. For the second purpose, however, the value of a classification will depend largely on the selection of significant differentiating criteria, and it seems doubtful whether a scheme based on a small number of definite properties chosen mainly for their convenience, as suggested by Leeper, would meet this objective. Whether a classification needs to reflect genetic relationships in order to be useful has been much debated, but in view of the status of soil as a component of the eco-system, it is at least questionable whether an approach which begins by considering the soil as a static body divorced from its environment is likely to lead to a generally useful or intellectually satisfying system.

In recent years increased understanding of soil processes and relationships appears to have brought agreement on systematic concepts appreciably closer; and for the moment we can only hope that, in the words of Sir Arthur Tansley, 'the classifications that do least violence to the facts will survive and the beds of Procrustes will be discarded.'

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CLASSIFICATION IN SOCIAL ANTHROPOLOGY

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MUCH that has been said by other speakers is applicable also to Social Anthropology. This subject emerged as a distinctive academic discipline in the period 1860–65 and was the direct result of an attempt to apply the concepts of Darwinian evolution to social phenomena. The basic axioms of the subject are thus closely analogous to those of nineteenth-century botany and zoology. Words like 'tribe', 'people', 'society', 'culture' have been confused with the more biological concept 'race' and have commonly been used as if they had the qualities of Linnaean 'species'; *i.e.* they are assumed to denote entities which are fully discrete and self-perpetuating, each with its own distinct evolutionary history. There is also a tacit assumption that any such entity, when recorded by the anthropologist, is in a stable condition. Given these assumptions it becomes meaningful to attempt a systematic taxonomy of entities based in some regular principle of monothetic division. Such a taxonomy will of necessity be of a pyramidal segmentary type, such as the following:

1. All societies either possess unilineal descent systems or they do not.
2. All societies which have unilineal descent systems have either a matrilineal system or a patrilineal system or else they have both at once.
3. All societies which have matrilineal systems either have a systematic residence pattern or they do not.
4. Matrilineal societies which have systematic residence patterns are either virilocal, uxorilocal, avunculocal, . . . *and so on.*

This kind of thing is not simply a phenomenon of the nineteenth century. Only last year (1961) a close colleague of mine published an elaborate and widely applauded 'Classification of Double Descent Systems' which is precisely in this style.

I do not find it surprising that this kind of thinking was fashionable around 1860; I find it very extraordinary that it should still be with us a century later. The real-life phenomena to which the category words of social anthropology apply have none of the characteristics of 'species'. If we ignore such exceptional cases as small island communities in the Pacific, there are nowhere any sharp boundaries in social phenomena. Cultures merge into each other and are much more likely to be in a condition of rapid change than in a condition of stability; individuals can, and frequently do, change their cultural identity; within our own lifetime, indeed within the last decade, dozens of new political systems have sprung into being which have scarcely any roots in the past and which could not have been fitted into any taxonomy of political systems devised, let us say, before 1914.

It would appear, therefore, that much of the orthodox argument of social anthropologists belongs to the realm of scholastic 'realism': it is concerned with universals rather than with things. Too much intellectual subtlety goes into distinguishing the universal essence of 'marriage', 'the family', 'unilineal descent groups', 'witchcraft', 'sacrifice', and so on.

Among the anthropological classifiers of social systems there seem to be several divergent views as to just what it is that is being classified. Some, but probably a minority, believe that this kind of ratiocination leads to the discovery of truly existent characteristics of naturally existing things. Such a view would imply that the boundary between one society and the next is something which can be defined by objective criteria. A more tenable view is that which finds its basis in Max Weber's concept of 'ideal types'. Different varieties of social system can be distinguished and classified in terms of 'models'; it being fully appreciated from the start that empirical social situations will never be anything other than approximations to these idealized, oversimplified states. This style of analysis is commonplace in various branches of applied mathematics where, for example, the most complex oscillatory movements may be represented as an approximate combination of a number of elementary sinoidal curves. But this method of reaching the 'truth' by a series of successive approximations has many drawbacks. In particular it sets a premium upon established orthodoxy. A really good ideal type model can be stretched to fit almost any conceivable situation!

The Ptolemaic system of astronomy which finally crumbled under the onslaughts of Copernicus and Galileo was just such a model of ideal types. It had been assumed ever since Greek antiquity that it was a law of nature that heavenly bodies should always move in perfect circles. By constructing a typology of multiple epicyclic combinations it proved possible to fit the observed ellipses of true astronomy to the erroneous circular dogma of ideal geometry. Some of my anthropological colleagues appear to believe in a similar way that certain traditionally accepted sociological conformations are a 'law of nature'. When the empirical facts of the case appear to contradict this proposition they easily get rid of the difficulty by introducing new taxonomic sub-types of their original ideal categories.

There is another group of anthropological model makers, of whom I myself am one, who look upon classification as a purely *ad hoc* procedure. We recognize that any classification which is useful today is likely to prove a frustrating handicap when the interests of research workers have changed ten or fifteen years from now. Indeed, in social anthropology the climate of ideas often changes so fast that a scheme of classification may already be out of date by the time it achieves the respectability of appearing in print.

Although most social anthropologists write and talk as if they firmly believed in the permanent value of the categories with which they operate it is quite clear that in the past the selection of a scheme of classification has largely depended upon fashion and accidental circumstance. Late nineteenth-century social anthropology had an evolutionist bias. Patrilineal societies were distinguished from matrilineal societies and it was then dogmatically asserted that the latter represented a chronologically earlier stage of social evolution than the former. The logic by which this was shown to be the case is quite fallacious and the principal 'cause' of this doctrine would appear to have been that its prime originator, Lewis H. Morgan, had himself done field research among a matrilineal people, the Iroquois Indians of New York State. He thus had a vested interest in the belief that the Iroquois had a thoroughly 'primitive', *i.e.* chronologically early, form of society.

Likewise, since 1940, the dominant theme in British social anthropology has been the classification of segmentary lineage systems. It so happened that the society which was first subjected to a precise formal analysis in this style was that of the Nuer of the Southern Sudan. Because of this chronological accident, coupled with the lucidity of the writing style of their observer, the Nuer have come to be thought of as having a peculiarly *pure* type of patrilineal lineage system, and other lineage type organizations have tended to be judged true or false according to the degree to which they correspond to the Nuer type. There are no grounds for thinking that the Nuer are especially typical of anything in particular and I suspect that if Professor Evans Pritchard had done his fieldwork in a different part of the world our taxonomic prejudices on these matters would now be entirely different. This kind of situation is, I believe, quite familiar in other academic disciplines.

So much for the past; what of the future?

My own view is that the social anthropologist would gain a great deal if he took the trouble to understand the principles of electronic computers. Essentially, a computer handles a limited number of elemental factors. It examines the data with which it is presented to see which factors are present and which are not, but it also examines for the presence or absence of all possible combinations of these factors. Finally it describes the objects of its investigations in terms of patterned clusters of factors, instead of by means of a list of isolated characteristics as in an orthodox monothetic taxonomy.

We use taxonomies to save ourselves trouble. A taxonomy is based in the assumption that function and/or genetic history will set rigid limits to what is practically possible. The combinations which are palpably impossible are ruled out by the principles of the taxonomy. This is a time-saving device, but the trouble is that we may easily be overpersuaded that what looks impossible is not worth investigation at all. Compared with the time-saving taxonomist, computers are very stupid; they insist on examining *all* the possibilities. Mostly this is a waste of time, but not always, and that is the crux.

Respect for academic ancestors and living superiors leads us to respect the categories and classifications which they established and respected. An anthropological case in point is provided by a thirty-year-old dogma that 'the Nayar system is the most thoroughgoing example of perpetual matrilineal succession'. Radcliffe-Brown said it was so in 1935, and social anthropologists have gone on saying so ever since. Generations of undergraduates have been taught this gospel truth without any regard for the possible need for validation. When Radcliffe-Brown made this *ex cathedra* pronouncement he drew attention to a number of features of Nayar culture which he represented as characteristic of the extreme matrilineality of Nayar organization and this example has repeatedly been used to illustrate the perfect integration of cultural and structural phenomena.

Now the Nayar are a large Hindu caste mainly resident in Kerala State, south-west India, and it has been known for at least twenty years that none of the features which Radcliffe-Brown mentioned is in fact peculiar to the matrilineal Nayar. These and a whole complex of other cultural details are found not only among the Nayar but also among other non-matrilineal peoples of the same area. Moreover the Nayar themselves are not always matrilineal. Yet such is our respect for authority and established dogma that even those who were fully aware of the facts showed the greatest possible reluctance to question the interpretation of the Master. The difficulty was evaded by taxonomic subterfuge. Radcliffe-Brown had referred simply to the Nayar. His successor, Dr Gough, who is the expert on the facts of the case, has found it necessary to distinguish no less than five different sub-types of Nayar society. Radcliffe-Brown's dogma, it turns out, applies to just one of these. This surely is another case of Ptolemy's epicycles.

What is needed here, and indeed throughout contemporary social anthropology, is a wholesome disrespect for the categories of established orthodoxy. I am not suggesting that the anthropologist must actually go to the trouble of feeding his cultural information into the unprejudiced gullet of a computer but it is necessary that he should approach his data with the prejudices of a computer rather than with the prejudices of our ancestors as reflected in currently accepted taxonomies. The prejudices of the computer are very simple; they amount to saying 'We know nothing in advance; let us inspect the facts under observation to see how the elements are grouped into patterns.' The computer having investigated the problem will come back with a 'taxonomy', but it will be a purely operational taxonomy which satisfies one particular situation on one particular occasion. It is not and does not purport to be a final once-for-all revelation of ultimate truth.

This is by no means a minor matter. A computer-minded approach to the data of social anthropology will alter the whole nature of the subject. Traditionally the social anthropologist has always felt himself overwhelmed by the sheer complexity of cultural details. He has used his taxonomic procedures as a kind of Occam's Razor by means of which he can drastically reduce the variety of variables that deserve examination. He has tended to argue that cultural systems cannot be compared as wholes; we can only compare 'social structures' —which is rather like saying that the complete analysis of a painting by Botticelli is very difficult, but everything becomes much easier if we look at the picture through a colour screen which only shows up the colour red!

The coming of computers has demonstrated that direct analysis is *always* possible even when the organization of isolated factors is highly complex. Acceptance of this fact should mean that the social anthropologist will once again feel competent to handle cultural facts directly without first subjecting them to an analytical screening process, such as is implied by the currently orthodox 'structural' taxonomies.

CLASSIFICATION FOR DOCUMENTATION

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DOCUMENTATION is faced with the following problem. On the one hand we have the world's literature, in many languages; on the other, an inquirer with a question. Documentation has to select, from a vast mass of words, the few texts that are most closely relevant to an inquiry. It is this selection process that makes use of classification.

Every field of human knowledge is documented to a greater or less extent, and documentalists try to classify it. This wide variety of subject matter means that librarians, perhaps more than other professions who use classification, have been led to take a very considerable interest in the classification process itself. While current texts on logic are generally content to expound the traditional tenets of classification, documentation has been exploring new problems and new techniques. This, I think, is the justification for including a paper by a librarian in this conference of scientists. I will try to outline some of the problems we have encountered.

Cross-classification

The traditional ideal in classification is to arrange all the entities of a universe into a single hierarchy: one big family tree in which each entity belongs only to a single class, each species to a single genus, and so on. Such a 'strong' hierarchy is not always possible in documentary classification.

A given object can be classed in many ways for differing purposes: a rabbit can be classed as a rodent, a fur-bearing animal, a herbivore, a pest, a pet, and so on, according to the viewpoint of the classifier. While a taxonomic classification can hope to achieve a single hierarchy, because it has a single purpose, few documentary classifications are designed to serve a single purpose: they must aid users who have varied interests. Consequently documentary schemes must allow for cross-classification. For example, documentary classifications of soil may comprise four or five hierarchies: soils classified by climate (arctic, subtropical, arid, etc.), by physiography (desert, prairie, forest, etc.), by constitution (lateritic, calcareous, alkaline, etc.), by texture (sandy, clay, loam), and by mineral origin.

It might be thought that this cross-classification is due to what Mr Avery calls the failure of soil scientists to produce a generally acceptable classification, and this is partly true, but it is basically due to the varying purposes that the classification has to serve. This is shown again in the documentary classification of chemical substances. Chemical science has long since agreed on the basis of classifying substances—by constitution—but to serve all purposes we must also introduce classification by physical state (*e.g.* industrial gases), physical behaviour (*e.g.* gels), chemical behaviour (*e.g.* explosives), origin (*e.g.* petroleum products), mode of production (*e.g.* fermentation products), and even by scale of production (fine chemicals).

The need for cross-classification in documentation gives rise to problems in that a particular entity may appear in more than one hierarchy, and references to it may be scattered in various sections of a catalogue. The documentalist has had to devise methods of solving this problem, the details of which can be studied in references [1] and [2].

Entities to be classified

Taxonomy is basically concerned with classifying 'natural kinds'—of organisms, of soils, of substances. Documentation has to classify what is written about these objects, and must take into account not only the natural kinds but also their properties, behaviour, interactions, and operations on them. Consequently, quite apart from any multiplicity of hierarchies for the natural kinds themselves, documentary classification must provide hierarchies, or at least schedules, for other categories.

For example, a classification of Soil science, as well as hierarchies for soil, may contain schedules for soil structure, soil constituents (chemical and biological), soil properties (physical, physico-chemical and biological), soil processes (such as formation, translocation, ion exchange, erosion), operations on soil (such as drainage, tillage, amendment), and so on.

In recent years documentalists have given a good deal of thought to bringing some order into the variety of terms that occur in hierarchies such as these. The various hierarchies that can occur in the classification of a subject field have become known as the 'facets' of the subject. The expression 'facet analysis' has been coined. By this is meant the conceptual analysis of a subject to pick out, from the theoretically unlimited number of characteristics by which a subject could be divided, those that are most significant in the study and practice of the subject. For example, a facet analysis of Astronomy might isolate the following facets for classification:

Celestial bodies (star, comet, planet, etc.)
Their parts (axis, tail, surface, etc.)
Systems of bodies (galaxy, constellation, etc.)
Properties of bodies (size, temperature, etc.)
Properties of systems (*e.g.* distribution of stars)
Motions of bodies (orbit, rotation, etc.)
Relations between bodies (parallax, eclipse, etc.)
Interactions between bodies (perturbation, capture)
Operations (*e.g.* spectroscopic observation)
Tools (*e.g.* telescope).

In undertaking the facet analysis of a new subject field, it has been found helpful to use a list of so-called 'fundamental categories' as a provisional framework of facets. For science and technology, frequently occurring fundamental categories are substance, organ, constituent, structure, shape, property, object of action, action, operation, process, agent, space, and time.

Subjects to be classed

Documentation has to class documents: not single entities in a hierarchy, but composite subjects. Books may be written about single-termed subjects such as primates, tulips, phenols, podzols, or nebulae, but the papers and reports with which documentation must deal are compound subjects: the evolution of primates, the propagation of tulips, the nitration of phenols, the fertility of podzols, the rotation of nebulae. Many subjects are even more complex, for example:

Streptomycin therapy for osteomyelitis of femur
Fine structure of spectrum of helium atom
Effect of humus on crumb formation in loamy sand
Wind tunnel measurement of Reynolds number of boundary layer transition for model aircraft.

To class such subjects, documentary classification must co-ordinate or combine terms from several facets. When the product of this classing is in the form of a catalogue or a subject index, co-ordination gives rise to difficult problems. In what order should terms be combined so as to express the subject and aid the searcher? Should the searcher be led to a subject from every term in the compound, and if so how can this be achieved without excessive duplication of entries in the catalogue? These are problems into which has gone a good deal of thought and experiment, but it seems that we are still searching for elegant solutions.

Fields of knowledge

The scope of a documentary classification is usually designated by its title, the subject field that it professes to classify. It is no easy task to state what is meant by a subject field. In general it can be expressed as Thing-Activity. A definite and definable group of things (soils, celestial bodies, chemicals, food, etc.) is selected, and from the many relations in which they subsist a certain number is selected as relevant. The selected activities may be the entire range associated with the things (as perhaps in Soil science or Astronomy), or may be more limited (as in Food technology, where the agricultural, nutritive, hygienic, and gustatory aspects of food are excluded).

When a subject field has been selected and defined, analysis will reveal its facets. It is rather rare in documentary classification, however, that the librarian can restrict himself to a single homogeneous subject field. The average special library, serving the varied interests of its readers, will inevitably collect material on its central subject studied from marginal points of view, on tool subjects, and even on subjects quite distinct from its own which provide needed background information.

For example, in order to classify the literature of Aeronautics, it is necessary to provide a classification that includes not only central facets such as aircraft, their parts and structure, their operation and aerodynamic behaviour, but also subsidiary facets such as materials for aircraft structures, the manufacture of those materials, their physical properties, and mathematical tools for the study of aeronautics. The result is a very complex special classification.

It is easy to see that a facet that is subsidiary in one field of knowledge (as Properties of materials is in Aeronautics) is central in another subject field (in this case in Physics). This fact raises great difficulties when we come to the design of a general classification for, say, the whole of science and technology.

A general classification cannot simply be a collection of special classifications, with, for example, a slightly different assortment of Physical properties appearing in each special field where some form of Material is used. A more satisfactory solution would be a single schedule of physical properties, from which terms can be drawn into combination with terms from other facets as required.

Such a solution requires that we formulate a set of homogeneous facets which collectively are sufficient to express any subject in science and technology, and which avoid all redundancy; and secondly, if the product of the classification is in the form of a catalogue or a subject index, that we decide the most suitable order in which these facets should be combined to form compound subjects. We are a long way from providing a satisfactory solution to this problem, but I would draw your attention to discussions in references [3] and [4].

Application to documentation

Classification in documentation is a tool for selection. It is essentially a 'finding system' for documents. This function imposes on it characteristics that are irrelevant to its functions in taxonomy.

The first of these characteristics is that it is usually necessary to apply to the scheme a shorthand notation, for easy filing and finding. Librarians have paid a great deal of attention to the design of notations for a classified catalogue—so much so that some library classifications are known by the notational device they emphasize (the Decimal and Colon schemes). Again, the coding of schedules for use in mechanized search systems has been extensively studied by other documentalists. These problems are discussed in references [2] and [5].

A more important characteristic of a documentary classification is that it is an artificial language, designed as a tool to aid in the selection of information from a store in response to search questions. The classification serves to standardize subject description, so that the descriptions of a subject used by indexer and inquirer are more likely to coincide, thus maximizing the probability of finding all documents relevant to an inquiry.

A theoretical classification of a subject field can list all the facets encountered in that field, all the terms in each facet, all the hierarchial relationships of each term. But such a schedule may be far too detailed in relation to the set of documents to be classed. The scheme may provide a selective sieve far finer than is needed by the documentalist. Consequently, a documentary classification must reduce the theoretical detail to the minimum needed to carry out the selection demanded by searchers. Subsidiary facets that do not serve to separate one document from another can be eliminated. Specific terms that are not the subjects of independent texts can also be eliminated, or confounded with others under a more generic term. Hierarchies displaying generic relations that are not sought by inquirers can be eliminated. In short, the classificatory language must be the simplest that is needed to satisfy the questions and select from the documents available. All additional detail, no matter how theoretically or scientifically justifiable, is irrelevant.

I wish to conclude by emphasizing this concept of classification as a language, because it is one that has become of increasing importance in documentation. It has lain behind the exploration into notation and coding that has been a feature of the last few decades. It is now taking on a deeper significance. We now look on a subject description as the product of a linguistic transformation. The indexer has before him a written text, and the many statements therein are transformed, by selection and condensation, into one or more brief phrases. One challenging field of research that is now emerging in documentation is linguistic analysis, whereby we may be able to formulate rules for transforming texts into descriptions. If such rules can be formulated, then the way may be open to instruct a computer to perform the task.

From this point of view, a documentary classification is a condensed standardized vocabulary, with a simple standardized syntax, possibly related to natural language by a set of transformation rules. It is of interest that some students of machine translation of languages consider that a standardized artificial language of this kind could serve as an intermediary in the translation from one natural language to another. This view of classification may be a far cry from that of the taxonomist, and may have little relevance for him. But I fancy that Aristotle, with his deep interest in both logic and language, would be vastly intrigued.

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THE USE OF MATHEMATICS

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MATHEMATICS, in one form or another, has been used in classification from an early period, *e.g.* Bayes's formula, Boolean algebra, Cartesian co-ordinates. There has been renewed interest in this field lately because of the availability of electronic computers. First, however, one must have a clear idea of the questions one wishes to have answered, and for this reason I shall discuss the sorts of ideas that one can handle mathematically.

There is a close connection between classification and information theory. This is evident from the fact that whatever it is that one is classifying, what is ultimately handled is information. Similarly, those working on information theory ask much the same questions as those working on classification[2]. All classifications start with a number of entities which we wish to classify and their properties. Often one of the most difficult problems is to know what entities and what properties should be employed. In some fields this may be self-evident. For instance, in documentation, books and papers are fairly easy to define, and their printed contents (rather than the binding or colour or size) are usually the properties to be studied. In other fields this may be less simple; *e.g.* in medicine it may be difficult to define what we mean by some diseases or to know what symptoms we should list and what are irrelevant. In addition, when filling in the tables of data we must decide what is 'the same property' in two entities. Is the wing of a pheasant 'the same' as the wing of a partridge? Is it 'the same' as the wing of a penguin, or a bat or a bee? Such questions cannot be answered by machines (at least at present), and hence one must select and define the attributes clearly and unambiguously.

Methods of division of the collection of entities follow two main paths, the monothetic and the polythetic[3]. Monothetic divisions are exemplified by the well-known 'A not-A' dichotomies. Any group is here defined upon a unique set of attributes which is both necessary and sufficient to define the group. Such systems are relatively simple to use, and their mathematical properties are fairly straightforward. Alphabetization is a good example. Monothetic divisions, however, do not yield classifications of the kind we recognize as 'natural', that is those based on the greatest number of common concordant attributes. The latter are based on polythetic division, in which many different sets of attributes may be compatible with class-membership, and no attribute need be essential to class-membership. For example, the sets ABC, ACD, and BCD might form a polythetic class. Many of our everyday concepts are polythetic, though this has not been generally realized. Natural groups of animals and plants, types of vegetation, kinds of furniture—and of especial interest in this meeting, subjects like *chemistry, genetics,* and *classification* itself—are polythetic concepts wholly or in part. Such polythetic groups are made by us intuitively, but one can also do this mechanically. This involves successively a table of entities and their properties, a table of comparisons between the entities giving their overall similarities (or resemblances), and the grouping of the entities into clusters on the basis of the similarities. A number of alternative methods are available for this process—discussed by Sokal and Sneath[4]—which is a deliberate attempt to quantify the intuitive procedures that the human mind employs. These new methods of numerical taxonomy are now being successfully employed in the biological classification of many groups of organisms.

A special question which arises in documentation is whether there are any natural clusters or hierarchies of knowledge. Perhaps there are not, though in narrow fields there might be. It is true that people who write about automobiles are likely to write about engineering and metallurgy, but are less likely to write about philosophy or ecology, and thus certain clusters of interests may be defined. Nevertheless, such clusters may be nebulous and overlapping, as Mr Vickery discussed in his paper. It is instructive to look at Bishop Wilkins's 'universal language' of the eighteenth century. It was then thought that by pure reason one could set up permanently the whole structure of knowledge. Looking back we see that it was flavoured by Baconian and Newtonian ideas which today are quite unacceptable. It seems just as unlikely that we shall be able to make a permanent system of overall clustering of knowledge. Nevertheless some stability is important because of the need for information retrieval, and a balance must be struck between stability and improvement of the system. This is well seen by contrasting botany and zoology with bacteriology. In the first two the scientific names are of great importance because they are keys to the literature. It would be unwise to change them without good reasons. In bacteriology there is much less early knowledge worth preserving, and we have therefore a much freer hand in revising the taxonomy.

Having defined the clusters in a polythetic system, we usually wish to summarize them in some way. A very common device in classification is the nested hierarchy. It is sometimes forgotten that it is only one of a number of ways of handling clusters of entities, and it does make some quite stringent demands on the material being classified. Only some material can give satisfactory hierarchies. To do so it is necessary for the distributions of entities to be strongly clumped in a 'character space' at every level at which a hierarchical division is to be made. Animals and plants seem in general to show the necessary properties and fall into hierarchies fairly well. It is very doubtful whether chemical compounds can be grouped into 'natural' hierarchies, though they can be grouped into arbitrary and artificial ones. The great advantage of hierarchies is the economy of memory they offer, together with economy of space in indexing, but other methods may be preferable, and more work on this should repay the effort, particularly in documentation.

It is always possible to summarize complex relationships in terms of a few factors. A number of mathematical techniques, such as factor analysis, are available for this purpose. This can only be done, however, at the cost of losing some of the information about the relationships. Maps are good examples of this; according to the purpose of the cartographer, different features of the terrain can be emphasized and others are omitted. It is now generally accepted, as Mr Gilmour has pointed out in his introduction to this symposium, that the kind of classification depends on the purpose of the classifier, and therefore there is no unique classification that is best for all purposes. Nevertheless, we do distinguish between special purpose classifications and those intended for more general purposes, and it is the latter which usually correspond to what we feel intuitively to be the more 'natural' classifications.

Another subject for mathematics is discriminatory analysis. By this is meant the identification of an entity with an existing group, by using attributes in such a way that the chance of correct identification is as high as possible. The classic example is the discriminant analysis of Fisher[1]. The principle may be shown by a simplified example. Suppose we wish to identify eggs from the White Leghorn or the Rhode Island Red breeds of hen. The first have rather large white eggs, the latter have smaller, brown eggs, but there is quite a lot of overlap in both properties. We may perhaps find that egg colour is rather better for making the identification than is egg size. We will therefore give more weight to colour than to size. The best weights to be used with given scales of colour and size can be found by discriminant analysis.

Classifications usually show trends caused by the tendency of certain attributes to occur together. Some combinations of attributes are therefore absent, and the corresponding pigeonholes are empty. With continuous variables some parts of the character space are thinly occupied. For example, a scatter diagram of the melting points of organic compounds plotted against their boiling points shows that almost all the compounds have higher boiling points than melting points. A scatter diagram of melting points versus solubilities in water shows an evenly filled space approaching a random distribution.

Such discontinuities and trends have interesting implications. In biology they reflect, among other things, the stringent requirements needed for an organism to survive; many theoretical combinations of characters would give creatures which would be patently non-viable. In chemistry the first example mentioned above reflects the fact that the molecular motion needed to melt a substance is usually less than that needed to vaporize it. Solubility in water, however, is not closely related to the energy required for melting; hence the random association. Gaps also occur in the subject matter of libraries, where they may reflect historical factors or gaps in knowledge.

Two consequences of these trends are worth noting. First, we need make little provision for empty pigeonholes. A biologist need not classify non-existent creatures. A librarian need not reserve a shelf for books on Aztec motor cars. It is the peculiar problem of the librarian, however, that no concept that can be imagined by the mind of man seems to be immune from man's writings; even Aztec motor cars will be written about some day, if only from the humorous angle.

A second consequence is that the trends may reveal underlying causes which were not apparent before, and hence they may yield new information about the entities, or at least point to problems awaiting solution. The distribution of the human A B O blood groups shows a strong trend: all known populations have blood-group frequencies clustering about 'high O', 'low A', and 'low B' frequencies. The explanation is not yet known, but it is the distribution pattern that has made us aware of this unanswered question.

Many of these mathematical methods can now be handled quite cheaply by computers, which will in the future find increasing uses in problems of classification. Besides their application to the topics discussed above, they will also greatly assist the handling of the data itself, and we may look forward to their use in indexing and information retrieval as well.

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GENERAL DISCUSSION

The Chairman, in summarizing what, to her, seemed to be the general burden of all the papers, said that there had been a good deal of insistence on being perfectly sure of knowing what was relevant before trying to make schemes or hierarchies. So often arbitrary guesses were made about what factors might prove relevant. The machine might help us to find likely relevances and profitable lines to pursue. Classification or the organization of knowledge developed in this way was not only a useful tool for information retrieval but might even show up gaps in knowledge, as it had done before in chemistry, and this might lead to the discovery of new knowledge.

Dr F. H. Whitehead (experimental taxonomist) said that he was grateful for the introduction of history to the discussion. It was important in botanical taxonomy because history and philosophy had produced many present problems. Goethe's change of personal philosophy from Kantian to Spinozan had led him to put forward anatomical concepts of 'essential' leaves, etc. These in the nineteenth century became identified with 'primitive' leaves. This way of thought was the antithesis of experiment. In practice it consisted of thinking deeply of the ultimate realities behind a mass of observations. This type of speculation was still widespread in taxonomy and had to be taken into account in any attempt to gain acceptance of rational principles in plant classification. Present classifications would probably be largely unaffected, but it would be a welcome change for taxonomists to admit that convenience and purpose were more important in practical matters than mystical 'grand orders of nature'.

Mr G. B. Milner (linguist and anthropologist) said that, as a social scientist, he approached an august gathering of natural scientists with trepidation. He was concerned with the description and classification of exotic languages.

A point which Dr Walters had made about initial work in one part of the world affecting classification in general was of great importance and could be borne out in the field of linguistics. For instance, because language had been extensively studied in a part of the world where Indo-European languages were spoken, it was taken for granted that all languages must have subjunctives, supines, gerunds and so forth. There was the case of grammars of African or other exotic languages being written somewhat as follows: Chapter 5: Gender. This language has no gender. End of chapter. This was another example of the kind of bed of Procrustes that Mr Avery had mentioned. If a language did not fit in with the prototype, so much the worse for the language.

One had no sooner succeeded in getting away from those preconceptions in linguistics than a danger arose of falling into new errors. For instance, there were new categories, such as that of the phoneme or the morpheme, which were already showing signs of becoming petrified. The question, as Dr Leach had put it, was of knowing how to unscramble the eggs, the eggs being the data before they had been scrambled into categories. Mr Gilmour had spoken of classification as a means to an end. Might it be that here also the means conditioned the end?

Mr Vickery had referred to the problem as being not to decide what things were in themselves, but what to call them. This was a remark of great interest to a linguist. The act of naming was, it seemed, culturally and, more specifically, linguistically determined. It was important to notice what happened when something was given a name. Speaking as a linguist, one agreed with an anthopologist such as Malinowski that the act of naming was a creative process: 'In the beginning was the word'. Naming had also a ritual aspect. With great reverence one could recall that when a Christian priest consecrated the elements, he named them, and then *Something Happened.*

When a name had been given, however, and used in all sorts of different contexts with greater or less rigour, there was always a possibility that it would become a kind of incubus. Three brief examples could be given, the first being from ethnography. When Captain Cook explored the South Seas he had noted a Polynesian word associated with certain patterns of behaviour. The word was *tapu* (*Anglice* taboo). Both the word and its associated concepts had been discussed in anthropological literature for perhaps 150 years and 'taboo' had, as a result, become a technical term and a point of reference in studies on primitive religion. The speaker had analysed the use of this word in languages like Maori or Tongan, from which it was originally borrowed. There appeared to be a wide gulf between the word as it functioned in its original linguistic and cultural context, and the way it was used in anthropological literature.

The second example concerned the setting up of an entity known as proto-Indo-European by the early comparative philologists. This had been of undoubted value for the comparison and putative history of the modern Indo-European languages. Then came the concept of an original and actual language spoken by the 'Indo-Europeans'. From that point the search proceeded for a culture and a country in which the Indo-Europeans, now people of flesh and bone, could have lived. That is to say, by dint of constant handling in different contexts, what had originally been a useful abstraction, had become so 'real' that it could provide a basis for the development of a myth.

The third example was taken from the field of physical anthropology. According to a standard textbook by Hooton, published in 1949, simple combinations of only a few characters could be employed for the demarcation of three primary races of *Homo sapiens*. The following 'sorting criteria' could be quoted (from a number of others):

For the Negroid race:

i Hair form: woolly or frizzly.
ii Skin colour: dark brown to black.
iii Nasal index: 85 and over.

For the Mongoloid race:

i Hair form: straight, coarse texture.
iii Skin colour: yellow or yellow-brown.
v Eye form: opening slit-like, slanting; upper lid with total... or internal... epicanthic fold.
vii Cheek bones with strong frontal and lateral jut, usually covered with pad of fat.

However the Bushman-Hottentot group had the following characteristics:

i Hair form: spirals growing in pepper-corns.
iv Skin colour: yellow to yellow-brown.
v Nasal index: 85 and over.
vii Cheek bones: Mongoloid lateral and frontal jut; fat padded.
viii Eyes: slit-like, slanting, frequent internal epicanthus.

Faced with these contradictions Hooton might have abandoned the division of mankind into three primary races, as a working hypothesis which was no longer tenable. By that stage, however, the classification had become so 'real' that he was driven to speak of a Bushman-Hottentot composite race and to suggest that the Bushmen and the Hottentot might have originated from Asia and thus have shared common ancestors with the Mongoloids.

Dr Sneath had spoken about a suggestive way of overcoming that kind of difficulty, but one would like an assurance that clusters were not also linguistically and culturally determined. For instance, when distinguishing between apples and oranges one was in fact utilizing a pair of linguistic signs. If an expedition to Mars were to find fruit with features characteristic of both apples and oranges what would happen to those clusters? Could they for instance be regarded as universals?

Dr Sneath replied that they were not universals and they were only clusters of what was known. On the whole the feeling was that there were disparities.

Dr A. F. Parker-Rhodes (mathematician) said that what impressed him from the morning's discussion was the persistence with which working biologists agreed in battling away at the old biological classification and saying how bad it was and that it did not work, whereas, in fact, it had stood up for a very long time. When studying something closely, particularly if from a slightly abstract point of view (as with many of those specialists in classification present) one was liable easily to get a wrong sense of proportion.

Looking at biological classification from the point of view of one used to dealing with things like information retrieval problems and language problems, the most striking feature about the material was how extremely easy it was to classify. Compared with some things in other subjects, it came very well classified. It was possible to make a mathematical model in all sorts of ways, making multidimensional diagrams for the different characters, and so on. There were all sorts of sophisticated mathematical devices for exhibiting the facts. If that were applied to the great majority of living organisms, however, one would not find out anything but what had already been known for one hundred years or more. The same old species would come out. The more one went into sub-specific taxonomy, or into groups like the bacteria which had a different kind of interrelationship with the higher organisms, the more one realized that there was a lot more to it than attaching names to all the branches of a hierarchy. In palaeontology, there was the trouble that many species were seen dividing, and it was necessary to say where the division came. This was a further complication.

All this, however, was nothing compared with the complications that arose when studying things of which the classification was *not* fundamentally hierarchical. This happened in documentation, and it was worse still in trying to classify the words of a language according to their meaning or even their syntactic use.

The use of mathematics in tackling this kind of problem was open to a rather basic misunderstanding. Two thing could be done. The first was to have a 'user' orientation (a specialist classification). The second was to have a material-orientated general purpose classification. If mathematics was applied to a general purpose classification, a further decision must be taken about what was meant by general purposes. It was desirable to weight the characters and materials in such a way that the important things would come out and the unimportant things would be unstressed. This, however, was impossible. What was in fact produced was a taxonomic classification, which would have to be based on the attitude that 'It is clear to me from my general knowledge of the group that there are these things to be rated as important characters, and there are these to be rated as superficial, unimportant characters'. That might be right or wrong, but at least an answer would be obtained. If this were done by means of a computer, the same thing could be done at ten times the cost, but people would have more belief in it because a computer had been used. It was merely window-dressing.

The only thing that could be done with a computer and could not be done without it was to ignore all the distinctions of unimportant characters and to use unweighted characters, as Dr Sneath did in some of his work. The thing to do was to collect the characters all together without asking which were the important ones and to try to find out, from the results of the computations, which *were* the important ones. The result would not be further insight into the material, but a more useful classification for retrieving particular items from it. It would produce a retrieval system rather than a classification. It was not possible to get a better classification with complicated mechanical and mathematical aids than without them.

The biological classification system contained, by and large, a lot more information than was necessary merely for retrieving things, for which all that was wanted was an alphabetical list and a lot of boxes with the names on. There was far more in it than that.

By taking a mathematically constructed system—which, for obvious reasons, was more often done with groups like bacteria than with groups like higher plants—a quite different kind of information would be obtained. The information contained in, for example, classifying bacteria by all the various substrates fermented was never claimed to disclose any more than it said. A retrieval system and an informative classification were two quite different things.

Professor L. Silvestri (microbiologist) said his impression was that there was an important difference between the problem of classifying living beings—animals, plants, and microbes, for example—and that of classifying such things as documents, soils, societies, and so on. The difference was due to the fact that the character of living beings had a precise physical substrate in the genetic structure of these organisms.

When constructing a natural phenetic classification of a group of organisms, use was made of all the available knowledge on the phenotype. It was known, however, that the phenetic information that was sampled was nothing more than transformed genetic information. As such, the quantity of phenetic information was a finite quantity. The opinion was held that the number of characters that could be attributed to living organisms was not endless. This quantity, it seemed, could not be greater than the total genetic information.

A character of an organism could depend on more than one gene—for instance, the growth of a bacterium on a medium with lactose as sole C-source would depend upon a group of genes which controlled the production of the many enzymes necessary for the utilization of this substrate—but a character could not depend on less than one gene. By increasing sufficiently the number of the individuals examined, and by refining the techniques, it was possible to split a complex character into as many elements as there were genes responsible; but further splitting was not possible.

From that point of view, the classification of organisms was more similar to the classification of the elements of a jigsaw puzzle than, for instance, to the classification of soils. The reason was that in the jigsaw puzzle one knew all the elements of the pattern, which crossed the edges, and also their total number.

In the case of organisms it was possible to estimate with a certain degree of approximation the order of magnitude of the total phenetic information, which was of the same order as the genetic information. Meanwhile, in the case of documents, soils, and so on, there was no mean by which to attempt an evaluation of so important a factor as the total quantity of information. This was an important difference and it was relevant to the problem of the possibility of developing a natural system.

A point on which it would be helpful to have an opinion from someone more competent concerning information theory was the limitations that were introduced by the impossibility of evaluating the total information. On the other hand, and in consequence of that, a point which should be drawn to the attention of the biologists was that the most important element which differentiated living organisms was their information content.

It would be incorrect for instance to evaluate an index of similarity between an organism like a bacterium which possessed almost 10^4 genes and a mammal which possessed more than 10^{10} genes with the same battery of characters. In calculating the number of differences between these two organisms, it was necessary to take into consideration all the characters that were absent in one of the two. In other words, the number of the differences must be of the order of magnitude of 10^{10} minus 10^4, or something like 9 times 10^9. This number had to be introduced in the denominator of the fraction which represented the similarity index.

Rather than to discuss on this occasion, however, the details of the methods that could be employed to evaluate the similarity of two individuals, it was important to repeat that the phenetic information was nothing more than genetic information and that biologic taxonomists could not disinterest themselves from the problems of the transformation of the DNA code into the phenetic information.

A too formal approach to the problems of the biologic classification and a too simple equation of these problems with the problems in other kinds of classification could be dangerous and could raise objections from the followers of the so-called phyletic methods of classification.

The real common ground between the different disciplines had to be found principally and simply in the development of statistical techniques dealing with the multivariate analysis. Even though such views might be an oversimplification of the problem, the presentation of such a controversial issue could contribute to the general discussion of the topics.

Dr Walters asked how Professor Silvestri was defining 'gene' in this context.

Professor Silvestri replied that when speaking of genes, what was important and relevant to the issue was the gene as a unit of function.

Dr Walters asked in what way this entirely independent definition of gene which Professor Silvestri required for his argument could be *a*, retained and *b*, related to the variation with which he was dealing as a biological taxonomist.

Professor Silvestri replied that they did not know how the genetic information was transformed into phenetic information. If this were known, biology would be a lot more advanced. It must not be forgotten that organisms were built in a certain way. This represented a difference between the classification of organisms and the classification of other things where such a particular substrate had not been discovered.

Dr Sneath said that quite apart from the suggestion made by Professor Silvestri that organisms differed from other things to be classified in that respect—which was debatable—the important thing to be made clear was that according to modern genetic dogma, which might not be altogether right but was probably substantially correct, the entire genetic constitution, if one could but see it, could be written out in some form of code message as a DNA. This meant that it was limited. There were some ways in which it could be studied independently of recognition. One could take an enzyme and split lactose to allow the thing to grow. One could then say, 'This is an operational definition. The stuff comes out; here it is. I have it in a bottle.'

Next, chemical tests could be done on it which were quite independent of the previous operational assumption of the gene. This was additional evidence about the gene which could be obtained from chemistry. One could go into a library, pull out one volume of an encyclopaedia and say, 'I chose it on an operational criterion. It was physically separate by its binding. But, having got it, there is information inside it which is not independent, and which is finite and limited'.

Dr Cain wondered whether there was not a danger of yet another theory coming in and influencing classification to its detriment. If at long last there was an approach to an objective classification and a sharing of the physiological ideas of Aristotle, the disputed idea of Cuvier, and the ideas of Darwin, was it wise to take up genetic theory and apply it to classification, which in most cases was not done with any genetic knowledge at all?

Professor Silvestri expressed complete agreement but did not understand why, when taking all the existing elements of information about the organisms, it was necessary to discriminate against one kind of knowledge. Of course, there was no reason for this kind of information to be more important, but to ignore completely the data of genetics was not safe.

Dr Cain agreed that it should not be ignored completely. He said that it should be put on the same basis as anything else, but he did not think that any one theory should be allowed to direct the classification.

Mr Vickery, describing himself as someone who knew little about the subject, said that ignoring what Dr Sneath had said about independent access to genetic information, it seemed that they were dealing with two levels. At the first level, one would identify a gene on the basis of correlating a number of phenotypic characters. In a sense, therefore, that type of exploration was a clustering to determine what were the basic characteristics of the individual. But the next level, of how to cluster individuals, using the characteristics of each individual already identified, was a second-level classification.

Dr Sneath said that it was with embarrassment that the biologist had to admit that his primary information was often of a very poor sort. A lot of it turned on the question of what one should consider the same in two organisms. To beg the question, as was now being done, could lead to a good deal of difficulty precisely of the kind that various speakers had mentioned. First, one had to cluster information in order to obtain the primary characters. This clustering might not be logical, or it might be subject to sampling errors or other things.

One of the things that was most needed was a new look at the way of getting hold of biological information, by which to set up uniform criteria and make no prior assumption such as the genetic assumption. Was not this also true of other kinds of work? The subject of soils included the humus content. Was not humus a sort of assumption with a large number of, perhaps, rather ill-defined chemical properties which went through the human? Or if a classification was made of chemical books, was not chemistry a vague concept? A lot of these dangers underlay many other disciplines also.

Professor P. C. Sylvester-Bradley (palaeontologist) joined issue with the sentiments which had been almost universally expressed against using hypothesis in the construction of a classification. He thought that there were two sorts of unscientific taxonomy. One sort, though unscientific, was objective in that it dealt only with facts. But scientific method consisted of testing hypotheses; if taxonomy avoided hypothesis, it was unscientific. It provided material for science, but was not, in itself, scientific. There was another sort of unscientific taxonomy which so confused facts and theory that they were indistinguishable. This was the most common sort.

Classification could, however, be a scientific discipline if it first erected a working hypothesis and then proceeded to test it. Thus a palaeontologist might propose as a working hypothesis the simplest sort of phylogenetic tree: two descendants, *B* and *C*, springing from a common ancestor, *A*. To gather data to test this hypothesis, he would sample two geological horizons, one of which was older than the other: in strata, perhaps 25 ft. below. From these he would collect sets of specimens from a large number of different localities over a wide region—say, over Europe. The result might be some twenty-five collections each of one hundred specimens, from each of the two horizons.

This taxonomic scheme implied three hypotheses. The first working hypothesis had to postulate that all those from the lower horizon were capable of interbreeding, and thus fell into a single species (the common ancestor, *A*). This hypothesis had to be tested. If true, variation of all the morphological characters studied should be continuous. In the event of its being discontinuous, one would suspect the hypothesis to be false.

The second hypothesis would have to postulate that the specimens which came from the higher horizon fell into two discontinuous groups, the discontinuity being correlated with geographical range; thus species *B* might be confined to western Europe, species *C* to eastern Europe.

A third hypothesis would still remain to be tested: that species *A* was ancestral to both *B* and *C*. If that were true, the morphological variation of *B* should overlap that of *A*, as should the variation of *C*.

That was putting the case in its simplest terms. This sort of hypothesis must lie behind the taxonomy of all sub-species of fossil in ancestor-descendant relationship to each other.

There was, however, a difficulty. When examined statistically, collections from one locality were often found to be significantly different from those from all other localities, whether or not they were in the same region or on the same horizon. Such significance was statistical rather than palaeontological or taxonomic.

It therefore became necessary to give more weight to those characters which showed a difference in time than to those which showed no palaeontologically significant difference. Perhaps the two collections of one sub-species which showed a statistically significant but unimportant difference between themselves did so because their dead bodies were sorted by waves into different size-groups on different shell-banks. Biologically, this was not important. Or perhaps they lived in slightly different environments, when the differences might be phenological. Modern weighting methods were able to disentangle this sort of picture more clearly than the intuitive methods of a generation ago.

Mr M. J. R. Healy (computer-using statistician) said that previous speakers had been shy about saying what they really wanted a classification to do. Biologists and taxonomists might differ in this; while taxonomists used classification systems, biologists were able to use taxonomists. In general, he wanted a classification system to tell him what he might safely take for granted about an individual. No two individuals in biology were exactly alike, but similarities existed of different degrees, giving rise to classes at different levels. However, for the purpose of conveying information, a classification was a special case of a description, and in some fields—soil survey might be one—it was possible that the necessarily arbitrary formation of classes was undesirable. This had already been illustrated in physical anthropology. Aside from the detailed merits of the different systems, a description in terms of components of physique such as the somato type system of Sheldon was a far more satisfactory system than a classification into types in the style of Kretschmer. This was particularly true when individual characters were continuous and not discrete.

Professor M. Fortes (social anthropologist) followed up the remarks of Mr Healy by saying that Sheldon would not have reached his technique of analysing physical forms had it not been for his studies having been preceded by Kretschmer and others.

The point of this story, which could be illustrated from every department of science and particularly from anthropology, was that classifications had their day. They must have their day and cease to be. This was one of the signs of a living science, as each classification was its own worst or best enemy. Classification was, however, a kind of inherent, necessary, heuristic tool for any sort of investigation.

He hoped that he was mistaken in thinking that Dr Cain had spoken in disparaging terms of the endeavours to establish what animals really were like. What he was himself trying to do as a social anthropologist was, sooner or later, to find out what society was really like. If he were not doing this, he would write poetry instead of looking at society. When looking at things, one could not go anywhere without classifying; if one did, one was dealing only with Archibalds and Percivals in the end, and this achieved nothing scientifically.

An interesting aspect of the discussion was that it suggested two inherent tendencies or propensities of classification which had been pointed out long ago by the Greeks and with which anthropologists were familiar as a natural human characteristic. Wherever one went, one found that people of all cultures classified. A start was made by classifying men and women separately. This classification carried an enormous amount of information.

There was, it seemed, one trend which argued: 'Things belong to the same group, in the same class for heuristic purposes because they are alike; just because they are alike, I see them to be alike'. On the other hand, there was the point of view which said: 'Things belong to the same class because they have a common ancestor.' This was a very widespread, common, almost automatic human tendency which anthropologists would confirm on a comparative basis.

What was of interest today was to see that apparently the evolutionary paradigm—although, one suspected, not the hypothesis of organic evolution and all that that stood for—had entered a twilight period. This problem had been discussed by anthropologists thirty years ago, when the great revolt against evolutionary classifications ensued and there was a turning over to what Dr Leach called the functional way of looking at it.

Given those two possible ways of classifying, the question came down to Mr Gilmour's problem of 'What do you classify for? What sort of similarities, and so on, are you looking to establish?' The essence of classification surely was to bring together those things that were alike and to separate those that were different. When dealing with a continuous phenomenon or a continuous variable, it had to be split up. For example to do anything with stature, one had to stratify stature in some way, in inches, millimetres, yards, or something of that sort.

Classification was an indispensable, inherent, and necessary condition for scientific research. The problem really was: 'What is the most valuable classification to use at a given level of inquiry?' From some points of view, it could not be denied that animals and plants were different. They were differently classified. From other points of view, under a more inclusive category of living matter, one could make a leap from the genetics of sweet peas to the genetics of blood groups, classing them together in one universe of discourse. In social anthropology and all human sciences, this was a critical and cardinal feature.

Thus there remained the problem that, in seeking to classify, one was confronted with a sort of initial stage of the inquiry—the critical one—which had been stressed by Dr Sneath: *i.e.* what factors, variables, attributes, or properties should be picked out or sorted in the sorting mechanism. This had been the major stumbling block in dealing with the data of all the human sciences: the initial step of deciding what elements to look for. In this direction, the classifiers of the past had made an important and significant contribution. If we had learnt to distrust some of their classifications (*e.g.* in terms of matrilineal and patrilineal groups) this was simply because they had made that classification, and this threw up what in ordinary language would be called the exception.

Dr Cain sought to make one point clear since some people seemed to be in considerable disagreement with what he had not said. He no more rejected the theory of evolution than he rejected Professor Silvestri's ideas on genetics. He believed implicitly in both of them. One knew very well as a matter of history, however, that a number of classifications had been made in the past in which the theory had actually damaged the classification. He entirely agreed, and he had been careful earlier to say, that people were right in wanting to find out what things really were.

Although that was a very good thing to do, it must be pointed out yet again that where the classification was being made upon one scheme and the theory was a different one, and the theory was then allowed to affect the classification, nothing but confusion ensued. This was the situation which he had spoken against in his paper.

In consequence, there was no disagreement between them, except that he would advise considerable caution in biological taxonomy before accepting any present theory which might require changes, for the very good reason that any such changes would upset the reference system. It might be said that taxonomists should never have had a reference system which would be upset every time a new theory came in, but taxonomists were only human. It was doubtful whether such a reference system could even exist.

In reply to Mr Healy, names—which carried with them categories which people were inclined to consider watertight when they were not—were the reference systems that were used in ordinary speech. Compounded attributes might be all very well on paper, but to try to talk by means of them would be difficult.

That did not necessarily mean that every past classification should be rejected because it was past. An embryology of classifications was needed. A study of how they had developed in the given subject matter would be of immense practical interest.

Dr R. M. Needham (mathematician) reported that he had done similar computer experiments to those described in Dr Sneath's paper. In the experiments, which were on various sorts of data—none of it directly biological, some of it linguistic, some documentary, and some of it on two hundred medical patients—his search for a family tree of the kind described by Dr Sneath simply did not produce one. By defining the clusters differently it was possible to find other things instead which were nevertheless useful, but the data was extremely involved. It was not that the family tree did not fit: it was a non-starter. Had anything of this nature arisen in the biological world? If so, how had it been tackled?

Dr Sneath, who confirmed that it had arisen, said that by going right down to the species and sub-species at a geographical race level, a pattern was obtained which consisted of cloudy clusters which blended together. He would have expected some kind of clearer clustering in the medical example. Certainly, there must be material where the hierarchy would not fit. If somebody could find some other way of handling the data and mechanizing it, that would be fine.

Dr Needham said that as this so clearly arose in other cases, if it came up in biology one should not be worried. It was a criticism not of the method, but of the material.

Mr J. E. L. Farradane (chemist and documentalist) said that it was interesting to see the scientific point of view in so many disciplines and to compare it with the documentalist's point of view. A documentalist had to deal with all knowledge as so much grist to the mill, without preconceived views, and try to make order of it. That order was not anything that was settled, but something which would be helpful for retrieval in great detail. Whereas many scientists were dealing with individual items, as Mr Vickery had said, documentalists were dealing with complexes of ideas rather than items.

The scientists were not, it seemed, tackling the principles of classification as such. Were they trying to find something which could be regarded as a fixed natural order, relatively speaking, for use by others, or were they trying to find some means of ordering facts for a particular use, which was much more important? If the latter, the particular use would vary greatly from person to person. What was needed, therefore, was a set of basic material in some form from which grouping could be done in various ways as and when it was wanted. This meant not using a computer merely to determine all the possible clusters that were there, but using it to see whether the type of cluster in which one was interested was present. The aim should be to analyze the group of characteristics pertinent to one's area of interest, and then to see whether the material, not pre-sorted, contained those groupings. This would give a useful result if the groupings were found to be present, as confirming a hypothesis. From the point of view of the documentalist, it would be a workable classification.

The only trouble about it was that the material must in the first place be available in some relatively general order, from which the work could be started. The general order could not be completely random, or it would not be possible even to examine it and devise hypotheses.

Means had thus to be found for expressing the original material in a *relatively* unspecified manner, with the least bias. It might not be one manner—it might even be two or three in the first place—but it must be sufficiently general not to prejudice the results of an inspection for clusters. Whatever method was used for ordering, however, the concept of a class was a fickle thing, not a fixed law. It was something one invented for one's own purposes. It was always necessary to do this, for people could not live without creating classes to organize their knowledge, even, for example, in order to recognize the way to Victoria station; it was necessary to recognize what was a street, what a private garden, and so on, so as to follow directions. Classifications thus created should not, however, be things then to be applied on all occasions, or to other subjects, without due care.

This was the basic problem being discussed in the Classification Research Group. They were looking for principles of a general nature by which to organize material in the first place. The idea of integrative levels had proved a useful tool, but not a sufficient tool, for making progress, and others were being sought. Principles for handling complexes were also needed. The idea that any classification was sacrosanct was obviously wrong; it could be right only with specified conditions. The rules for the general order and rules for constructing special orders were both needed. In particular what was wanted was a concerted effort, especially by people from different disciplines, to find such basic principles and special principles which would be valid without reference to any particular set of material.

Mr R. Crawshay-Williams (philosopher) said he wished to try and clear up the point about what things really were. At the second order level of classification (*i.e.* the classification and ordering of classes themselves) everybody seemed to agree that the question whether a classification were correct depended not only upon the facts about the things being classified but also upon the purpose for which the classification was needed. This had not been generally accepted fifty years ago.

What was still not generally accepted was that it applied also, as Mr Gilmour had said, at the basic object level; *i.e.* to the classification of individuals and hence to the question of how they were correctly described. Oscar Wilde's remark about man being a rational animal who always loses his temper when asked to act according to the dictates of reason could be paralleled in the form 'Man is a classifying animal who always loses his temper when asked to explain why he says his own classifications are obviously correct'.

At the basic level, two tautologies should be emphasized: that things are obvious only when they are obvious, and that things are agreed only when they are agreed. If somebody said 'It is quite obvious that that is really a mirage', and if everybody in the company agreed, then it could safely be treated in that company as a mirage; and conversely it could not be so treated *unless* everybody agreed.

Professor Fortes was quite right in saying that we could simply examine things and decide, on a purely objective basis, whether they were alike—provided that the decision was unanimously agreed. But this was never legitimate when there was disagreement. Directly there was disagreement in any company as to whether things were alike, then at once it was necessary to define one's purpose as clearly at this basic level as ever would be done at the second-order level.

The implication was that it was all right for Mr Avery, Dr Cain, and Dr Leach to talk about intrinsic properties—about what things really were objectively—and about morphological similarities, while the company agreed as to what was in fact an intrinsic property and what was a morphological similarity. Directly there was disagreement, this showed that purposes were crossed and must therefore be specified explicitly.

Mr J. L. Jolley (indexing) said he wished to speak briefly of his own experience, which was wide but not very deep. There were two main reasons why people wanted a classification. *a*, They wanted to identify something, to know what to call it by defining what it was. For this reason, they wanted to assemble its characteristics so as to know. *b*, They wanted to know how characteristics within a given set of items were related to each other. In this case, although they did not mind *which* items had the characteristics, they minded *how many* items had them.

His experience as a consultant in indexing was that the same sets of characteristics were used by both people, but that they were used in different ways. A person who wanted to build up a description of an item, whether for the purpose of finding it (for example, because it was a book on a library shelf) or for the purpose of giving it a name (for example, because it happened to be an unknown sort of animal), or for any other reason, would use the ideas one way. If he wanted to compare probabilities within populations, he would use the idea in some other way; but it was still the same idea.

His own concern was with classifying meanings, not with classifying the things which might be described by them. It seemed that every meaning had a twofold quality. There was what it meant—its *significance*; and there was its *proportion*, the amount of it in the collection of items being studied.

Looking into the future rather hazily, he would hesitantly suggest that the sorts of classification coming into use—even the universal sorts—would consist of compartments into which different types of meaning could be placed. These would be used however people might wish to use them, but there would be a fixed set of rules, so that people could understand each other when talking about them.

There might, however, be no necessary order of quotation. A B C could mean C B A, if it happened that C B A was a better way of arranging the books on the shelf for one's purpose; the fact of having the characteristics A B and C together would be what mattered. In defining the item for which one was searching, or in comparing all things that were A B and C with all things that were, say, B C and D, this compresence would be the important thing. Such a classification would help the research worker to work with his own meanings as he needed to do, whilst at the same time enabling him to communicate with others, by saying within which general cell of the major table of ideas he was working.

The idea of integrative levels had been found to be of particular value in this analysis, also, and considerable progress had been made with it. It did not go the whole way, however; there had also been concentration on things called semantic types which assisted in a different dimension. This might well be the type of classification that would suit all parties. Such a forecast, however, was sticking ones neck out a very long way.

Mr Vickery, referring to Mr Farradane's remarks about the raw materials which, from time to time, were searched to see whether clusters that one would like to find did, in fact, exist, said that this was exactly what the searcher of literature did. He was hoping to find something about some hypothesized grouping.

On the documentation side, it had been suggested that the ideal method was simply to leave the books as they were in the British Museum and from time to time, whenever a question arose, to make a quick run through the text from beginning to end with a computer. This had been seriously suggested. The trouble was that life was too short and most searches could be aided by some prearranged grouping and classifying of the raw material. Clearly, from time to time it would be necessary to change the classification, because the ways in which users approached literature would change.

One of the discussions had centred on whether to use an hypothesis to do the preliminary sorting, or whether simply to cluster in appropriate mechanical ways what was offered in the way of raw text. In real life, hypothesis in documentary classification could not be avoided. In the first place, again life was too short in the sense that there was still no machine which could read text and take it into a computer, so that the raw material for the clustering process was very difficult to assemble. Secondly, no matter how much clustering was done, one would be working on a limited sample. This meant that many of the clusters which were known to exist, and the relations which, through the experience of mankind, were known to exist, would not be found in the sample.

For example, in any documentary classification of chemistry it would be stupid to ignore the relations that were known to exist between the chemical elements, simply because the bundle of chemical papers that were used as a sample did not happen to mention them. One would obviously want to build in something like Mendeleev's periodic table. That sort of hypothesis —already known semantic relations among the words used—could and should be put into the system.

On the other hand, he fully agreed with what Mr Milner said about relationships of that kind becoming barriers to clear thinking and names becoming an incubus. There were plenty of examples of this in the past history of classifications where people had tried to make distinctions. If two names existed, there was assumed to be a distinction between them and people tried to think up an imaginary characteristic dividing them. There must be a constant adjustment of the system to the growth of new knowledge.

Mr Avery said that nothing had been said to convince him that there was not, if not a fundamental difference, at least a large difference in degree between biological classification and attempts to classify things like soils, probably also rocks, and certainly social systems.

Using the criteria mentioned by Mr Crawshay-Williams, in the case of a very large proportion of organisms most observers, if they had the organism present, would agree about the objects to be classified. One would be far from certain that people confronted with a section or a sample of soil would agree on what particular entity was to be classified.

It was fair to say of organisms that there were quite a few fairly clear natural groups. With soils, the most that could be said was that with increasing study one came to feel that there *were* natural groups but that these natural groups had fuzzy edges. In attempting to classify objects or entities of the nature of soils, it was first of all necessary to define the entities; and in classifying the entities there was a tremendous temptation, to say the least, to search for some unifying theme or theory that would help to answer the question 'Why should I classify them in this way rather than in that?' The danger then was that the classification would fossilize the theory, and for certain kinds of objects it might be more dangerous to try to set up classes than not to set them up. However, so far as soils were concerned, there was no question that the classifications so far proposed had aided communication and drawn attention to gaps in our knowledge which had subsequently been filled. One had to be rather careful before saying 'You had better give up trying to classify soils, because you are really doing more harm than good'. He was in entire agreement with one of the speakers that attempts to classify things were a natural expression of that hope of ultimate comprehensibility and order, which was the mainspring of scientific effort. Another speaker had suggested that when dealing with continuously variable objects such as soils one might do better to specify them in terms of a number of separate characters, and to eschew recognition of classes. With this idea in view, one ought perhaps to ask oneself the question whether there was something about the whole object that transcended the sum of the parts. If the answer was in the affirmative, there would seem to be a justification for distinguishing classes.

Mr Gilmour said that it seemed to be fairly generally accepted by all the speakers that it was necessary to decide one's purpose; but from some of the remarks he was not happy that, although it was accepted in theory, it was always quite accepted in practice. An example was Professor Silvestri's remarks about the gene complex being so important in the classification of living things. As Professor Silvestri had put it, it rather sounded as if it had some sort of intrinsic importance, whereas, again, it depended on one's purpose. To a person interested in living things from the point of view of their biological mechanism, obviously it was of vital importance. Taking, however, a collection of apples with exactly the same genes, from Professor Silvestri's point of view they would be classified together—and, obviously, that was an important viewpoint for a particular purpose. If, however, the apples were being grown for profit, half of them might go down with a disease and the other half might not. From the point of view of the profit that was to be made, the important thing would be that half of them were diseased and half were not, and nobody would care whether they all had the same genes.

Alternatively, they might be classified on the names of the growers of the apples, in alphabetical order, for a particular economic purpose. What nobody would do was to classify them according to the colour of the hair of the grandmothers of the growers, because no conceivable human purpose would be served by doing so.

All these questions should primarily, in the middle, and at the end, be looked upon from the point of view of the purpose of the classification.

Dr Leach said it was agreed both that classification was necessary and also that its purpose should be established, but there remained the important question of how far the classification should go. For his own purposes, classification was a sorting process by which to put into a similar box things which looked alike. It was a game which could be pursued as far as one liked. If anybody became obsessed with classification for its own sake—and this was a legitimate procedure for biological taxonomists, but not for social anthropologists—every entity that was classified became a thing in itself which was different from any other thing. From his own point of view, the whole purpose of the work was then lost.

One started with a fairly broad class of things which looked rather alike. Then, one became interested in how alike they were. To pursue the classification too far, however, would mean having as many boxes as things, and the whole notion of similarity would be lost.

Mr Milner had made an important point of the magic of names in suggesting that when a classification had been made and a particular name was attached to a particular category in the classification, there was something extraordinarily magical about the name; one was possessive about it and refused to believe that any other thing could have the same name or that any other thing which had a different name could be alike. For this reason alone, it might be better to get into the habit of giving the categories, not names, but algebraic symbols of some kind.

Dr Walters felt that something he had said earlier had given rise to a misconception. He would defend orthodox biological taxonomy as a useful activity, and had made this clear in his paper, but in selecting from the paper he had, perhaps, given a wrong impression. The sufficient justification of orthodox taxonomy was that it had served the general purposes of biological science and continued to do so. It could hardly be expected to do everything for everybody. What it did rather remarkably well was a lot of things for many people.

The Chairman remarked that the summing up had been done by the authors. She invited delegates to express their views about holding a further meeting.

Dr Cain said he had profited greatly both by the remarkable resemblance of the problems from the different disciplines and by the contrasts. He very much hoped further meetings could be arranged. That day's should be regarded as a pilot meeting surveying the ground, but thereafter no attempt should be made to cover so much ground at one go.

Mrs O. Kennard suggested a further meeting to consider further uses for the computer.

Mr Farradane supported the idea of continuation for the special reason that there was not enough contact between the scientists who needed classification and those who sometimes tried to provide it. The 1948 Conference of the Royal Society had shown the need for a *rapprochement* but had failed to do anything about it. By taking special topics one at a time, good progress could be made.

Mr Bambrough also recommended continuation to discuss a number of philosophical questions. He said that many of the concrete issues raised by scientists were special cases of traditional philosophical problems.

Another delegate said that if a continuing organization developed from the present meeting he would ask for the inclusion of people such as industrial safety officers, quality control engineers, and others who undertook research.

Mr Leslie Wilson said it was clear that there was a desire for further meetings. He had always believed that the world of librarianship and documentation, which had implications for all the disciplines without being tied to any one, ought to take the initiative in seeing that interdisciplinary problems of the kind that had been discussed were investigated. He felt that, for the time being, it was better to go slowly, holding meetings, say, a couple of times a year, the next one being called in the autumn. He would be glad to arrange the next meeting, after which it might be possible to see where the discussions were leading.

By a show of hands, it was agreed to ask Aslib to organize a further meeting, if possible in the autumn.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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This post is graded within the Experimental Officer class at Assistant Experimental Officer level and the basic qualification is success in G.C.E. examinations in appropriate subjects, two of which are required to be at advanced level. Equivalent qualifications will be considered especially in the case of those applicants who have passed in whole or in part the Registration examination of the Library Association.

In addition to these qualifications, applicants should have had experience of work in a technical library.

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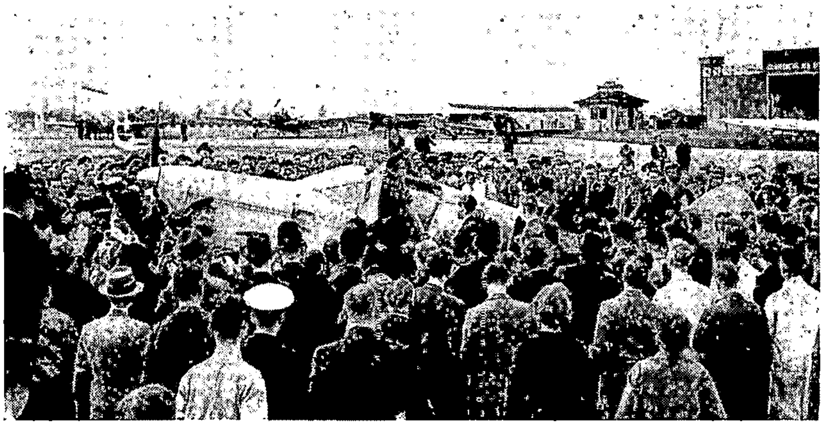

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2nd edition 1962

Edited by Wilfred Ashworth

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incorporating Aslib Information

Preparation of Scientific Material for the Press

G. N. J. BECK

Publishing Scientific and Technical Material

D. AINSLIE THIN

Library Bookbinding: Standards and Developments

DAVID MONCUR

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Aslib Proc. vol. 14 no. 9 pp. 267-306 London, September 1962

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 **September 1962** **Number 9**

ASLIB CALENDAR

1962

September

THUR.20. Technical Translation Group meeting at Aslib.
WED.26. Chemical Group sherry party at Aslib. See paragraph below.

October

MON.1. Midlands Branch meeting.
TUE.2 – THUR.4. Annual Conference at Norbreck Hydro, Blackpool.
TUE.16. Chemical Group meeting. See paragraph below.
WED.17. Course on giving references in catalogues, bibliographies and scientific papers begins.
THUR.18 – FRI.19. Course on photographic copying in the information department, at Dagenham. See paragraph below.
MON.22. Winter meeting at Aslib. 'Technical information services to a craft industry' by Norman R. Hood. See paragraph below.
TUE.23 – FRI.26. Junior introductory course to information work. See paragraph below.

November

THUR.8. Technical Translation Group sherry party at Aslib.
FRI.16. Northern Branch conference in Bradford.
TUE.20. Economics Group conference at Aslib. See paragraph below.
WED.21. Aeronautical Group winter meeting at Farnborough. See paragraph below.
THUR.22 – FRI.23. Scottish Branch second course on information work, in Edinburgh. See paragraph below.
MON.26. Winter meeting at Aslib. 'The implications to industrial and other special librarians of the new L.A. examination syllabus', by L. G. Patrick.
THUR.29 – FRI.30. Course on using foreign languages in information and library work.

December

TUE.4. Midlands Branch meeting.
THUR.6. Technical Translation Group meeting at Aslib.

Winter Meeting

Dr Norman R. Hood, Director of the British Paper and Board Industry Research Association, will be speaking at Aslib on 'Technical information services to a craft industry', on Monday 22nd October at 5.30 for 6 p.m.

In 1945 Dr Hood was called upon to create the British Paper and Board Industry Research Association. Until that time he had spent his working life in various divisions of Imperial Chemical Industries Ltd. He began with a staff consisting of himself only; in the intervening seventeen years this increased to about a hundred, of which a third are graduates, and there has been a sixfold increase of income.

In his talk Dr Hood intends to deal mainly with his own experiences of the problems, failures, and successes in his attempts to disseminate scientific and technological knowledge and have it applied in what is basically a craft industry.

Photographic Copying in the Information Department

A course intended for assistants entrusted with photocopying work in information departments is being run for Aslib at the South-East Essex Technical College and School of Art, Dagenham, on Thursday and Friday, 18th and 19th October. A wide range of the most up-to-date equipment will be demonstrated and students will be given ample opportunity to use it themselves. There will also be lectures designed to give students a fuller understanding of the various processes, their potentialities and limitations, and the place of photocopying in information and library service. Applications to attend should be made *to Aslib* on the form enclosed in this issue. As the numbers on the course are strictly limited, students are advised to apply early.

Junior Introductory Course to Information Work

A course for those who have recently taken up junior posts in special libraries and information departments will be held at Aslib from Tuesday 23rd to Friday 26th October. It is designed to increase their efficiency by giving a better understanding of the reasons for various routines and practices, and of the function they fulfil in the framework of an organization. It is also intended to serve as an introduction to fuller professional studies, and guidance will be given on further study and professional reading. Lecturers will include Mr Robert Collison, Chairman of the Aslib Education Committee; Miss Margaret Gauntlett, Kodak Research Library; Mr G. P. Henderson, Guildhall Library; Mr D. Mason, ICI Dyestuffs Division; and Mr Jack Bird, Aslib Education Officer. Visits to representative libraries and information departments will be included in the course. The fee will be five guineas. A full programme and application form are enclosed in this issue.

Scottish Branch Course on Information Work

Following last year's success, a second course on information work has been arranged for November. It will be held on 22nd and 23rd November in the rooms of the Royal Society of Edinburgh, and, like last year's course, is planned to help the small industrial unit. It will cover the following subjects: planning, furnishing and stocking a new library; setting up an information department; preparing a library bulletin; answering inquiries; trade catalogues; and classification. It is hoped that members will bring this course to the notice of any of the smaller industrial firms who have, or are setting up, a small library. Requests for further information should be made to the Branch Secretary, Mr H. Greenshields, 27 Sweyn Road, Thurso, Caithness.

Aeronautical Group

The 1962 winter meeting is being held at the Royal Aircraft Establishment, Farnborough, on Wednesday 21st November. The main feature of the programme will be an account from Mr Robert Fairthorne of his sabbatical year as a research professor at Western Reserve University's Center for Documentation and Communication Research. It is hoped to arrange a tour of the library and other parts of the Establishment. Further details will be announced in the October issue of *Aslib Proceedings*.

Chemical Group

The autumn programme will begin with a sherry party to be held at 3 Belgrave Square on Wednesday 26th September at 6 p.m., followed by a paper to be given at 7 p.m. by Mr J. G. Hall of Esso Research Ltd—'Making the most of what you've got: exploitation of limited resources in the chemical information field'.

A joint meeting of the Group and the London Section of the Society of Chemical Industry will take place at 14 Belgrave Square on Tuesday 16th October at 6.30 p.m. The speaker will be Dr G. M. Dyson, Research Director of the Chemical Abstracts Service, and his subject 'Research at Chemical Abstracts'. Tea will be served from 5.45 p.m.

Economics Group

The Economics Group is holding a one-day conference on Tuesday 20th November, on 'Economic information', at Aslib. There will be four sessions, conducted by small panels of speakers, to examine the following aspects of the main theme: sources; staff; storage; and service. A fifth, 'hobby-horse', session will provide opportunities for those who have not spoken earlier to make their contribution. A copy of the programme and reservation form is enclosed with this issue of *Aslib Proceedings*.

Course on Reference Work

A full-time course on reference work has been arranged at the North-Western Polytechnic in conjunction with the Reference, Special and Information Section of the Library Association. The course is intended for professional librarians with experience of reference work and will be held from 17th April to 17th May 1963. Further details and application forms may be obtained from the Department of Librarianship, North-Western Polytechnic, Prince of Wales Road, London NW5.

Association of British Library Schools

The Schools of Librarianship Committee was reconstituted in July as the Association of British Library Schools. The Association is open to a wider range of membership than under the old constitution, and invites affiliated membership by library associations, universities or technical colleges with library schools, and other institutions. The subscription for affiliated members is 1 guinea a year, for personal members 10*s* a year; there is no charge for corresponding members overseas. Personal membership will be mainly for full-time teachers in British and Irish library schools, but may be open to others associated with full-time schools. A grouping of the membership by subject interests is being considered. Requests for details of the constitution and other information are invited by the Hon. Secretary/Treasurer, Mr P. G. New, Department of Librarianship, North-Western Polytechnic, Prince of Wales Road, London NW5.

Conference on Production, Management and the Common Market

The Institution of Production Engineers and the Production Engineering Research Association are organizing a one-day conference on production, management and the Common Market, at Melton Mowbray on Wednesday 31st October 1962. Problems of the effect of the Common Market on research, production, management and labour relations will be examined. The conference is open to all research workers, directors, managers and engineers concerned with manufacture, sales, personnel and training. Special arrangements for travel and hotel accommodation are being made for delegates. The fee, including coffee, lunch and tea, is 3 guineas, and the closing date for applications is 16th October. Leaflets and application forms are available from the Conference Organizer, Production Engineering Research Association of Great Britain, Melton Mowbray, Leicestershire.

National Productivity Year

The National Productivity Year will have its official opening in London on 14th November. Activities for the year are being planned on a national scale and will include a joint conference of industrial associations in Birmingham, entitled 'Services available to industry', and courses and seminars all over the country. NPY is being supported by firms, associations, including Aslib, universities, and technical colleges, and will sponsor industrial team study visits abroad. All inquiries about NPY should be addressed to the British Productivity Council, Vintry House, Queen Street Place, London EC4.

Keywords Index to US Government Technical Reports

The first two experimental numbers of a new index to the *US Reports* have appeared. The reports covered include those issued under PB or AD numbers, and as NASA or AEC documents.

The index is compiled mechanically, and part 1 is described as a 'permuted title index', since it includes entries under an average of six keywords for each report. Part 2 consists of an alphabetical list of reports, arranged under the corporate author, but including title, personal author, date, number of pages, contract and report numbers, identification number, and price.

The index will provide a useful key to the abstracts published in *US Government Research Reports,* particularly when retrospective searching is necessary. It is being issued twice-monthly for one year (June 1962–June 1963) as an experiment and is at present supplied free of charge to subscribers to *USGRR*.

Petroleum Chemistry USSR

The Pergamon Institute has published the first issue of *Petroleum Chemistry USSR,* containing translations of selected papers from the Russian journal *Neftekhimiya* which began publication in 1961. This issue contains full translations of the important articles from vol. 1, nos. 1 and 2, and abstracts of the remainder and of those in no. 3. The translator of the English journal is B. J. Hazzard and the translation editor is D. L. Samuel.

Petroleum Chemistry is to appear quarterly, and the annual subscription is £30. The publisher's address is Pergamon Institute, Headington Hill Hall, Oxford.

Book Exhibitions

Two joint exhibitions, entitled 'Books for industry' and 'Management' (the latter chosen by the British Institute of Management) will be held in the Lecture Hall of Swansea Public Library from Saturday 20th October to Wednesday 31st October. Together they comprise an exhibition of the latest scientific and technical books of outstanding interest to people in industry and management, and are being organized by the National Book League and the Swansea County Borough Education and Public Library Committees. The times of opening will be: Monday, Wednesday, Thursday, Friday, 10 a.m.–6 p.m.; Tuesday, Saturday, 10 a.m.–5 p.m. Further information is obtainable from the Swansea Public Library.

In December two joint exhibitions on 'Management' and 'Photography' (the latter selected by Kodak Ltd) will open at Harrow. They will be held in the hall of the Harrow School of Art, from Friday 28th December 1962 to Saturday 5th January 1963. They will be presented by the National Book League with the co-operation of Kodak and the British Institute of Management. The times of opening will be: Monday to Friday, 3 p.m.–7.30 p.m.; Saturday, 10.30 a.m.–5 p.m. The Harrow School of Art is in Station Road, a few minutes walk from Harrow Station (on the Metropolitan Line from Baker Street). Further information is obtainable from the National Book League or from P. Woolland, Booksellers, Station Road, Harrow, Middlesex.

ASLIB SCOTTISH BRANCH CONFERENCE

THE Scottish Branch held its first residential conference in Perth on 16th–17th March 1962. Five papers were given, three of which are published in this issue of *Aslib Proceedings*. It was decided not to publish the opening paper, 'Communication in science', by Dr Archie Clow, since it had already appeared in another journal.* Similarly, as much has been published by Aslib and others on the availability and translation of foreign publications, Dr D. J. Urquhart's paper on this subject has not been published here.

PREPARATION OF SCIENTIFIC MATERIAL FOR THE PRESS

G. N. J. BECK
Assistant Editor, Endeavour

Scottish Branch Conference, Perth, 16th–17th March 1962

MY brief for this talk has been a rather broad one. I have been asked to speak on either the 'Preparation of scientific material for the press' or 'The editorial function', the second being a much wider and somewhat vaguer commission than the first.

May I therefore beg your indulgence if I fall a little between two stools and discuss some problems that arise in the preparation for press of a rather special kind of scientific journal and the way in which the editors tackle them. I hope by so doing to throw some sidelights on general scientific editorial practice, a subject upon which a number of excellent handbooks have been published in recent years. I intend to say a few words about these later.

I must at the outset say a few words on the nature and aims of our publication *Endeavour*. This is a quarterly international scientific review published since 1942 by Imperial Chemical Industries Limited, in English and in four foreign-language editions, French, German, Italian, and Spanish.[1] Although I assist in a general capacity with the English edition my own particular concern is the foreign-language editions. I shall nevertheless be concentrating my remarks on the English edition, with only occasional digressions into foreign territory which I hope will prove of some interest.

The contributors to *Endeavour* are drawn impartially from all fields of scientific activity—the academic world, research institutions, and industry. Although the cost of production and distribution is borne entirely by ICI—*Endeavour* can be fairly described as a prestige journal, not a house journal—no discrimination is made or has ever been made in favour of contributions by scientists on the company's own staff. To help maintain the international character of the journal we frequently include contributions from abroad. The original and continued purpose of *Endeavour* is to give scientists both at home and abroad a balanced survey of the progress of science. *Endeavour* is distributed free of charge to individual scientists, scientific institutions, laboratories, and libraries throughout the world. The total circulation of all editions is about 43,000 copies.

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* Talking about science. *Journal of the Institution of Electrical Engineers,* vol. 7 (new series), January 1961, pp. 16–18.

Each number of *Endeavour* contains a regular two-page editorial, followed by six to seven scientific articles ranging in length from three thousand to eight thousand words, the longest or main article usually being printed first. The issue concludes as a rule with five to eight pages of book reviews, classified by subject. There are generally four sides of black and white photographs and it is our practice to illustrate one of the articles, whose subject is frequently selected with this purpose in mind, with at least two full pages in colour. This we know to be a major attraction of the publication, the coloured plates being especially prized by our readers and would-be contributors abroad.

Now to subject matter. I can best illustrate the results of our attempts to give a balanced conspectus of all branches of science by quoting a few statistics for the past ten years. These, by good fortune, are easy to obtain from the classified decennial index for 1952–61 which was published with our January 1962 number. We find that 36 per cent of the articles dealt with the biological sciences, 26 per cent with physical subjects including astronomy and geophysics, 17 per cent with chemistry and biochemistry, 16 per cent with the history of science, and 5 per cent with technology (engineering sciences and metallurgy).

You will see that our emphasis is primarily on pure science, with a generous leavening of historical material and a rather more modest complement of articles on applied science. The majority of the articles may fairly be described as being of the survey or 'integrating' type, although occasionally the results of original scientific investigations are given their first full hearing in *Endeavour*. It is not our general policy to seek 'scoops'; moreover, the fact that we are a quarterly—perhaps fortunately from an editorial point of view—makes us an unsuitable medium for publication of 'red-hot' news, details of sensational 'breakthroughs' and similar ephemeral material. One of the most difficult problems facing the editor is the choice of the right level of scientific complexity at which the articles should be written. It is reasonable to assume that our readers will be trained scientists or science students, with a small minority of laymen with a very keen interest in science. Too much has been said already about the perils of over-specialization and the virtues of non-specialization for me to take up your time now by adding further platitudes. Barriers between the sciences are all the same being steadily broken down nowadays and our purpose in *Endeavour* is to assist in this work of demolition. Let me now give some concrete examples to illustrate the problem. We published not long ago an article entitled 'The nucleolus of the cell nucleus' in which the author delved deeply into the theories of the biochemical function of this organelle or component of the living cell. Clearly our physicist reader, even if he may have reached 'ordinary level' in biology, would require some very special incentive to read to the end of an article of this type. Conversely a biologist, with a fair grounding in physics, would be inclined to jib at an article on electron-spin resonance, replete with equations from quantum mechanics. These are no doubt extreme examples. Nevertheless, a generally attractive presentation, generously illustrated, an invitingly written headnote, and introductory paragraphs that are not too overburdened with jargon will do much to overcome this 'reader resistance' in unfamiliar subjects. It would, however, be rash to claim that many of our readers will read an issue from cover to cover and derive benefit from all the articles. If an average reader could be found, we would feel our work well rewarded if he were to read and appreciate two-thirds of the articles.

The articles for *Endeavour* are obtained mainly by direct commission from potential authors who receive a reasonably generous fee for their contributions. The editor is guided in his choice of subject and of author by an advisory editorial panel composed of academic scientists each eminent in his own sphere. Appointments to the panel have been directed towards achieving a broad representation of the main branches of science. The panel are by no means a rubber-stamping body, meeting merely to give formal approval to editorial decisions. They are encouraged to play an active part in the production of the journal. Members advise the editor by acting frequently as referees of contributions on their receipt from the author, while the texts of all proposed articles are distributed to the panel, who also read the galley proofs. Points of special difficulty are settled between the editor and member of the panel concerned, and of course with the author. The panel meets eight times a year, before and after publication of each issue. Time is reserved at these meetings for suggestions for future contributions, in addition to the regular business of discussing on broad lines the contents of the issue that is about to be published, or giving their criticism of one that has just been published. The passage of a contribution through to publication is greatly smoothed if the editor is able to make the personal acquaintance of the author, preferably at his place of work, to discuss the proposed article and at the same time to allow the editor himself to gain a broad understanding of the kind of scientific work that is to form the subject of the article.

Personal and amicable relations with the printer are another essential factor in the frictionless day-to-day running of a periodical publication. We are fortunate in having the Kynoch Press, of Birmingham, as our printers, the press actually forming part of the company. A detailed production schedule is drawn up at the beginning of each year and is mutually agreed by editor and press. Some ingenuity is required in designing this schedule, which is staggered throughout the year to accommodate all the five editions, beginning with the English and followed by the foreign-language editions at two-weekly intervals. The order in which the foreign editions appear is determined by the promptness with which the respective translations are received from abroad and not by the need to serve readers in any one language before those in another. From the point of view of the printers, all the four foreign languages used are equally difficult to set, so the order in which they are tackled is immaterial. It is vital that both parties adhere strictly to the schedule once it is agreed, for delays by the editor in submitting copy or returning proofs are cumulative and lead to disruption of the work of the press, who, needless to say, are engaged on other work besides *Endeavour*.

EDITING PROCEDURE

The mechanics of editing scientific material for *Endeavour* probably do not differ greatly from those employed by other scientific journals publishing articles of a comparable academic level. There are, however, two factors peculiar to *Endeavour* which we have continually to bear in mind when preparing our copy for press. First, the edited English articles have to be translated into four foreign languages; second, some thousands of our readers of the English edition will not possess English as their mother tongue.

In a general scientific review of the type of *Endeavour,* the writing of the editorial or the procurement of the material upon which an editorial can be based is the prerogative of the editor. Our international readership requires him to possess considerable breadth of scientific outlook. For a number of years past our editorials have encompassed a wide range of general topics of scientific interest—reports on international scientific activities such as the work of the International Council of Scientific Unions, social aspects of science, and so on. Choice of subjects of wide appeal is by no means easy, but we have to seek to avoid parochialism at all costs and ought therefore to reject subjects that appeal only to a minority of home readers. Furthermore, we have to take care that the editorials and indeed the articles as a whole do not contain references that might give offence to any group of foreign readers.

The editing of the author's manuscript must above all be aimed at achieving maximum clarity and conciseness of expression, without altering in the slightest the sense of the writer's words, while at the same time preserving as far as possible his individual style. We send brief general notes of guidance to all contributors, some of whom do their best to conform, but much routine editing usually remains to be done.

Notwithstanding the high academic status of many of our authors, there is a very wide variation in the quality of the English of the work submitted. It would be invidious to single out any class of scientists as better writers of English than another, but my impression is that the writing of pure scientists is generally superior to that of technologists and engineers. There is a school of thought among elderly professors that no one under forty is capable of writing an intelligible piece of scientific prose, but this charge is hard to substantiate—a counter-accusation against the over-forties is in fact possible.

I should like now to discuss a few examples of the many possible improvements in style that the editor can make. Such modifications have, of course, no bearing upon the technical content of the article.

Wherever possible, involved sentences should be broken down into shorter, more expressive sentences. Passive constructions, so popular in scientific prose, can in many instances be replaced by active ones. There can be no objection to the occasional use of the first person plural, but the editor ought not to tolerate the use of the passive form and the pronominal 'one', 'we', and 'you' in the same or consecutive sentences, as has occurred in some hastily written copy.

Sir Ernest Gowers,[2] Professor R. O. Kapp[3] and other authorities[4–7] quote examples of prolix phrases that can be replaced by simple synonyms of one or two words. Thus we may meet 'in view of the fact that' where the writer could have said 'because', 'of the order of' instead of 'about', 'the measurement was not in error by a large amount' where four words would have been saved by saying 'the measurement was not far wrong'. Fresh examples of such woolly expressions are continually cropping up and the editor must be on the alert to remove them. He should, however, exercise some moderation, for an excessively terse, telegraphic style does not lend itself to easy reading.

The editor should always have the *mot juste* at his finger-tips—he should be able discreetly to correct minor misuses of words. He should be ready to put the author right when he writes 'portentous' but means 'pretentious', when he writes 'eliminate formation of' instead of 'prevent the formation of' or 'remove' an omission instead of 'repair' an omission. Minor improvements of this sort may pass unnoticed by the author when he reads his first proof. Indeed, after his manuscript has been skilfully edited, he may sometimes get an unwarrantedly high opinion of the quality of his own writing.

The editor can also help to remove another cause of irritation to the reader that arises when some authors repeat *ad nauseam* a noun or adjective to which they have formed some peculiar attachment. A recent article we edited contained three repetitions of the word 'vicissitudes' and seven 'noteworthys' in the first three pages. Words of this sort are easily replaced by synonyms without laying oneself open to the charge of making unnecessary 'elegant variations'.

The tendency of some authors to create portmanteau adjectives is something that may well be in the editor's power to curb. Biologists are especially prone to concoct such unpleasant-sounding expressions as 'myosine-activated neurones'. J. B. Baker[8] attributes this habit to the influence of American scientific authors, many of whom are of German origin and who find it 'natural to write in an involved style'. That there is a strong Germano-American influence on current English cannot be denied—we have only to think of the objectionable compound adjectives that assail us in any 'easy-to-read' advertising copy, but I doubt whether it comes any more naturally to the German author to write his occluded, encapsulated sentences than it does for his English-speaking colleague to write as follows:

'Without doubt the greatest increase of output from a given volume of material has been achieved in turbogenerators, where the conventional air cooling with its five principal temperature drops (namely from ambient air or water to cooling air, cooling air rise, cooling air to iron surface, drop in iron circuit, iron surface through insulation to copper) has been replaced by inner cooling of stator and rotor conductors with hydrogen at several atmospheres pressure or water, which yields only three temperature drops, namely ambient air or water to cooling medium, rise in cooling medium and temperature difference between cooling medium and copper.'

In *Endeavour* we are obliged, for the reasons mentioned earlier, to keep our eye open for the too colloquial phrase or the less familiar idiom that may be misunderstood by the translator working abroad or by the non-English reader. When, in one of our book reviews, the author was described as having arranged his facts in 'apple-pie order' he was reported in our Italian edition to have done so *alla rinfusa,* which is the sort of order in which he would expect to find the apples in the pie after baking.

Vogue-words and neologisms we also try to avoid, until at least they appear to have gained general acceptance in the more serious general and technical literature. Examples are 'stem from' for 'arise or originate from', 'exciting' for 'interesting' or 'attractive', 'philosophy' for 'attitude' or 'concept'. A case might be made for the creation of some regulating authority for the English language comparable to the Académie Française for French and the Academia Real Española for Spanish.

It is almost impossible to draw a hard and fast line between the jargon and orthodox terminology of any branch of science. Jargon-type words are continually graduating from the spoken patois of the laboratory to the dignity of inclusion in internationally approved glossaries and terminologies. All we can do is to urge our authors always to provide definitions of newly coined terms and of terms that are the most likely to be unfamiliar to scientists of other disciplines or even to specialists in other branches of their own subject. There do nevertheless occur instances when some jargon word can be replaced by a more everyday word with no sacrifice of meaning. 'Moiety', beloved of organic chemists and lawyers, is a good example. Our French translators unfailingly render it as *moitié,* which it is not—'portion' or 'fraction' usually conveys the sense quite adequately.

We advise our authors of botanical and zoological papers, whenever they refer to the popular or trivial names of less familiar plants or animals, to append the Latin name. The 'sea purslane' or the 'tooth-billed cat-bird' mentioned in recent issues may have no equivalents in other European languages or they may have popular equivalents varying within the same country.

In view of our breadth of subject coverage it would be inadvisable to make too rigid stipulations concerning the systems of physical units to be used. The problem arises mainly in our physical or technological contributions. Where, for example, an author expresses his quantities in c.g.s. units we would not ask him, or attempt ourselves, to convert them to the corresponding m.k.s. units. We do our best to follow in our usage of letter symbols, signs, and abbreviations the recommendations of British Standard 1991 Part I (General) of 1954.[8] This standard is based on the recommendations of a Royal Society Symbols Committee and takes into account more recent proposals of the IUPAP and IUPAC. Last year four more parts of the Standard were published covering chemical engineering, nuclear science and applied chemistry, fluid mechanics, structural mechanics, and applied thermodynamics, and the Standard is likely to be extended to cover still more branches of science. Since this British national standard bears the stamp of international authority, we may feel confident that we will be making no serious departures from accepted international usage when we follow the British Standard for symbols and abbreviations in our foreign editions. Our printers also use it as a work of reference and usually query any inadvertent lapses on the part of the editors.

It sometimes happens, however, that international bodies recommend certain symbols or forms of spelling that are not generally adopted by specialist journals in the subjects concerned until some years have passed. One case in point concerns chemical articles in our German edition. In accordance with a IUPAC recommendation[9] certain rulings have been laid down for the German-language region, rationalizing the spelling of inorganic compounds, thereby bringing German usage into line with that of other European languages. Thus *Oxyd* should now be spelt as *Oxid, Monowasserstoff* written for *atomarer Wasserstoff*. These have still a most unfamiliar appearance and in such cases it would be more prudent for *Endeavour,* as a general journal, published in a foreign country, to take its cue from German-language chemical journals in their country of origin.

Careful editing of the author's manuscript with attention to some of the points I have mentioned greatly simplifies the task both of the translators and of the editor who is preparing the foreign copy for press. The duty of the foreign editor first and foremost is to ensure agreement between the translated texts and the original English. Where minor discrepancies occur he can usually rectify them himself but any major divergencies have to be taken up with the translator responsible. The routine preparation of foreign copy for press is otherwise a fairly straightforward task. Our own translators are usually specialists in the branch of science concerned and are always native speakers of the language. A greater degree of legibility is of course required in all handwritten corrections on foreign copy submitted to press, as the compositors, although now experienced in the setting of foreign literature, do not themselves possess special linguistic qualifications.

Diagrams submitted by authors have usually to be redrawn by draughtsmen, while graphs and line drawings need as a rule to be adapted to our established style, for example in the labelling of co-ordinates and the elimination of unwanted detail. Care has to be taken that references to all diagrams and photographs are included in the text and that captions do not repeat at length information already contained in the text. References and bibliographies are amended where necessary to correspond to the style of contraction used in the *World list of scientific periodicals,* and titles not found in it—the last edition was published in 1952—are contracted according to the principles given in the *List*. The titles of Russian journals, to which references are increasingly being made in British publications, are printed in Cyrillic characters, mainly so as to avoid using the not very popular international system of transliteration with its diacritical marks or the need for transliterating into five 'national' schemes.

PROOFS AND PRINTING

The proof reading of *Endeavour,* as with many technical journals, is done in three stages—galley, page, and machine sheet (or imposed page proof). Our practice is for the editor to read all galley proofs and the page proof from cover to cover, and to inspect the machine sheets to verify that all page-proof corrections have been correctly interpreted by the press. We send to authors for perusal both galley proofs and page proofs of their contributions. Foreign-language galleys and page proofs are also sent to the translators, and as these are read too by the foreign editor a double check is obtained.

The purpose of the galley proof is for checking, not for alteration. The manuscript as sent to press should represent the final thoughts of author and editor alike; a recommendation to this effect is in fact incorporated in the British Standard 1219 : 1945 *Printers' and authors' proof corrections*. This is, however, a counsel of perfection, and corrections for second thoughts are sometimes inevitable and necessary, as new developments may occur while the manuscript is in the hands of the press. Authors are often unaware of the cost of making trifling corrections, especially at the page-proof stage, and these must be discouraged. The British Federation of Master Printers recently drew up a leaflet entitled *Authors' alterations cost money and cause delay* . . . which deserves wider publicity among authors. It is self-evident that foreign-language galleys set by English printers will contain a fair sprinkling of literal printing errors, wrong accents, faulty word-splittings, and the like, so that especially careful proof reading is required. If time permits, the page proof should be read twice, the first time to eliminate all elementary printing and grammatical errors and the second time more 'intelligently' to ensure that the text contains no factual errors or omissions.

Since 1945 there has been a steady output of publications, in both this country and America, on the subject of the presentation of technical information, mainly from the point of view of the author. Relatively few of these books and articles, however, treat the subject from the editor's standpoint, but there is of course a great deal of common ground. In their comprehensive work *The technical writer*[5] published in 1959, Godfrey and Parr reproduced a critical bibliography on the presentation of technical information which was prepared at the invitation of Unesco. The bibliography contains sections on general works on language and composition, the technique of technical writing, books on printing, binding, and publishing, books on collection of material and references, on compilation of indexes, and guides for authors. Apart from including references for the last three years, it would scarcely be possible to improve upon this list as far as the English language is concerned.

I can, moreover, warmly recommend Godfrey and Parr's book itself—it has a bias towards the literature of electrical engineering (a forgivable reflection of the authors' own interests) but gives an admirable survey of the whole field of technical and scientific writing and publication. It delves more deeply into some of the topics I have only lightly touched upon and gives what seems to me to be a thorough coverage of aspects of the subject such as printing processes, preparation of illustrations, typography, etc., with which other speakers will be dealing.

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PUBLISHING SCIENTIFIC AND TECHNICAL MATERIAL

D. AINSLIE THIN
Director, Oliver and Boyd, Edinburgh

Scottish Branch Conference, Perth, 16th–17th March 1962

PUBLISHING and printing have travelled a very long way in the last 150 years. There had been no basic changes in the working of the printing press between its first inception and the early nineteenth century. In those days each letter was both cast and set by hand. The maximum speed of an expert founder was about six letters per minute. This works out at more than half a day's work for a page.

Nowadays the printers and publishers have at their disposal some very fine machinery. Modern casters can operate at a speed of 150 letters a minute. A printing machine will print 2,500 to 3,000 sheets an hour.

Let us start by examining the advanced or fairly advanced scientific or technical book. I suppose the first observation we can make is that these are relatively expensive, perhaps you think too expensive. If we are talking about British books I would say that they are in fact remarkably cheap. You will be acquainted with the following argument: 'When you consider that the accessibility of a single piece of information may perhaps prevent a grave hold-up in production; or that for a pound or two one can buy the considered opinion on his subject of a world expert, and that this one book can be consulted in the library by as many or as few people as care to do so, then the price of almost all such books seems very reasonable.' In itself this argument does not justify a high price on a book. If we were to price books in accordance with the value of that book to an individual or an industrial firm we would get some fantastic results. But if we compare the prices of British books with those of other countries our prices are not unreasonable. As you know, American books are generally more expensive than ours, often by about 50 per cent. French and German books are probably marginally more expensive and Scandinavian books are roughly the same price as ours. Russian, Polish, and Czechoslovak books are much cheaper, but then, of course, their labour costs are much less and their production is poorer. There are some books from Poland and Czechoslovakia which are particularly carefully and well produced, but on the whole their production standards are markedly poorer than ours. Every now and again, however, I see a British book which I feel sure has been priced with an eye rather on the maximum price which the publisher feels he can obtain for it than on a consideration of costs. The author, of course, normally has no say in establishing the price of his book once he has entrusted his manuscript to a publisher. The information in the book may be almost invaluable. It may for the first time expound new cost-saving techniques in a particular industry.

Persons working in that industry may feel bound to buy that book whether it costs £2 or £4. The publisher in such instances is in a strong position. However, fortunately, most publishers are (I believe) honest people and don't yield to the temptation of pricing as high as they can. But there is perhaps the odd publisher who lets us all down by pricing his books so as to receive an unusually large profit if he sells out his edition. Librarians can do much to eliminate such practices by refusing where possible to buy books which they think are too expensive, and by advising prospective authors to contact the reputable publishers. But remember I am not making a general statement that books are too dear—in fact the majority are probably too cheap to sufficiently recompense the author, publisher, printer, and bookseller.

It is not reasonable to make a statement to the effect that scientific and technical authors are either well or poorly paid. Almost every case is different, and many authors are seeking professional kudos rather than hard cash. Nevertheless some do pretty well, and few of them are likely to do as badly as the authors of unsuccessful fiction, who may make as little as £50 or £75 for their labours, which may have lasted many months—but of course in such instances although the author makes something, if little, the publisher makes a crushing loss.

I wonder if you know how badly David Hume did with his *Treatise on human nature*? This book, certainly one of the most important ever published in Britain, appeared in 1740 in an edition of one thousand copies. This first edition satisfied the philosophic needs of our country for the next eighty years! The rate of sale averaged twelve copies a year.

The author of a specialized research monograph which sells, say, 1,500 copies at £3 will receive in royalties a total of £450. This may sound quite a lot of money, but remember that the author is probably one of the top people in his profession, and that the book may have taken two years to write and be the fruits of many years of research. With authors at professorial level much of that £450 may well go in tax. The authors who do best are those who write successful university or school textbooks. I have a few examples of such books here:

1. Schmidt's *Organic chemistry* was first published in 1926 and is now in its seventh edition. It sells at 35*s*. The total sales since the war have been 27,000 and the annual rate of sale is now about a thousand. A book with this rate of sale will earn royalties of about £250 per annum, and total royalties earned since the war would be about £7,000.
2. Noakes's *New intermediate physics* is a textbook for first-year university students and sixth-form school pupils. It is not published by Oliver and Boyd and therefore I do not have access to the sales figures. I do know, however, that one Edinburgh bookseller sells about two hundred copies each year. I think it therefore unlikely that the annual sales of this book are less than three thousand. If the figure is three thousand the author will be earning royalties each year of about £700.
3. Another example is Caunt, *An introduction to the infinitesimal calculus*. This is an Oxford University Press book first published in 1914 and since reprinted thirteen times. This, of course, is an exceptional example, for

> there are very few scientific subjects in which it is possible to envisage using the same textbook, without revision, for nearly fifty years. An Edinburgh bookshop sells regularly each year about one hundred copies. It would not, I think, be rash to suggest that this book has sold more than 100,000 copies since publication. It now sells at 25*s*. I do not know its price when it was first published, but although the price will have been lower, so the value of that money will have been greater. Based on today's price the royalties earned by this book are in excess of £20,000.

I have, however, carefully chosen these three books because they were all exceptionally successful textbooks. By far the majority of authors will receive total royalties, probably received over several years, varying from about £150 to £1,000. The preparation of the manuscript will probably take between six and eighteen months, and the author will also have to spend time correcting proofs and in all probability preparing an index.

It is fair to say, therefore, that there are a few authors who are handsomely rewarded for their efforts, but by far the majority are rather poorly paid when one takes into account their special qualifications and the time they have sacrificed. They are, however, on the whole a reasonably happy band of people, and many of them have been helped to their professorial seats by the books and articles they have had published.

There are a few professional technical book writers, but not many—Rolt Hammond is one who writes on civil engineering subjects and I imagine that Samuel Glasstone of *Physical chemistry* fame and author of some other textbooks must almost be in the same category. The majority of authors are scientists or technologists who write books because by doing so they think they will further their professional career—a few, probably very few, do it because they are attracted by the money.

Sometimes, but rather seldom, an acceptable manuscript reaches the publisher right out of the blue—sent possibly because the author knows that the publisher already handles books in his field and because he likes the production standards of the publisher concerned. Generally, however, a busy scientist will not start writing a book until a publisher has prompted him to do so. It is often very difficult to trace the origin or originator of an idea for a book. The technical publisher will in the course of his work speak with authors, editors, or librarians who may introduce him to their colleagues. The publisher must always be alive to new ideas, and eager to follow up suggestions. For example, he may discover that there is a need for a book on crystallography; he must then make inquiries as to who is the best person to write this book. The first person he asks may be too busy, the second too lazy, but if he pursues the matter he will probably find someone. But can this person write? If the prospective author has already written books successfully there is little risk and the publisher may decide to enter into a contract right away. But if this is not the case the publisher will normally ask to see one or two specimen chapters before he finally signs a contract with the author. The author will probably find that the royalties he is offered are 10 per cent of the published price on the first three thousand copies sold, 12½ per cent for the next two thousand copies sold, and 15 per cent thereafter, though if the book is one of a series the royalty may be a level 7½ per cent or 10 per cent throughout. The author will be responsible for providing the publisher with a carefully typed manuscript and the illustrations, which will normally have to be redrawn in the publisher's office; the author will also be responsible for reading the galley proofs and page proofs and will usually be required to prepare the index.

On receiving the manuscript the first thing the publisher is likely to do is to send it out to an independent outside authority for comment. In fact, he will most probably (and this is a house rule in my firm) obtain two separate reports on it. This is a very important step. Very often the referees make some useful suggestions, perhaps point out some vital omission which leads the author to improve his manuscript. And of course if the manuscript is a bad one it will be damned for ever at this stage.

Once the publisher is satisfied that the manuscript is accurate scientifically, the next step is to read through the text, marking it up for the printer, and I am afraid in some cases it may be found necessary to rewrite the manuscript—in English. A brilliant scientist has not always time to consider the niceties of grammar.

The publisher must decide which printer is best equipped to handle this particular manuscript. In all probability he will obtain estimates from two or three printers before making his decision. Estimates can vary by as much as 20 per cent, so it is important that he selects his printer carefully and takes into consideration price, quality, and speed of production. Some publishers own their own printing works, and this can be a great advantage, particularly if the printing works are on the same premises as the publishing offices; at least we find it so. Our printing department prints most of our journals—which it likes because this is pleasantly predictable, regular work—but it also tends to find itself landed with the rather awkward manuscripts which the publishing department has to oversee with special care. It is also given mathematical and chemical texts for which its composing department is especially equipped.

The publisher of course must decide the type face to be used in the book, he must plan exactly the layout in every detail—and there are many details to be considered. For instance, in our books we prefer to have the 'cm' written without a full stop after the 'm'. A manuscript may come in with a full stop inserted in every instance; although it is more likely that the manuscript will arrive with the full stop omitted sometimes and inserted for no good reason on other occasions.

It may be necessary to have the illustrations redrawn, in which case they must be sent to the author for checking before they are sent to the blockmaker. In technical and scientific books the cost of the illustration can be a very considerable factor. An artist will charge about 20*s* for redrawing a normal not too complicated line illustration. The book may have two hundred of these illustrations; the artist's fee then is about £200 and the blockmaker's fee is likely to be another £200—a total of £400. On a printing of two thousand copies this will account for about 13*s* of the final selling price when allowance has been made for expenses and the usual trade terms. It may be of interest to note that the price of the block for a full-page line diagram is about 35*s*, and about 55*s* for a half-tone (*i.e.* photographic) illustration. Colour illustrations are very much more expensive, and a set of blocks for normal four-colour printing will cost about £35 to £50. You do not need many colour illustrations therefore to increase the cost of a book radically. There are, of course, authors who are able to draw the necessary diagrams themselves or arrange for them to be done by a draughtsman in their department. We have found such an author recently in a certain Professor Kennedy, who has written a book on creep and fatigue in metals which we will publish very shortly. Professor Kennedy has proved himself the almost ideal author. In a period of nine weeks he drew 350 diagrams for his book, and drew them very competently. This has saved us about £250 in artist's fees and will allow us to publish the book at a considerably lower price than would have been possible otherwise. Any lettering that has to appear on an illustration is normally set up in type and pasted on to the draughtsman's drawing. The illustration is then reduced in size photographically, if this is necessary, and the block made. Proof pulls of the blocks have to be sent to the author for checking.

When an author receives galley proofs he will be asked to check them carefully and return the corrected proofs as quickly as possible. It is always about this time that the author finds that he must attend an international congress in Australia! Or perhaps he is moving house. Both authors and publishers are agreed, however, that galley proofs always arrive when the author has least time to deal with them—this could well be one of Parkinson's Laws. When the proofs of both the text and illustrations are returned to the publisher he sends them to the printer, who makes the necessary corrections and fits them together, producing in due course page proofs. The length of time this stage takes depends on the number of illustrations and tables and the complexity of fitting the text round these, but the time taken also depends very much on the amount of correction to be made on the galley proofs. An author is often tempted to have second thoughts at this stage, perhaps introduce some new proof or completely rewrite some sections. Heavy correcting can be done but it is extremely expensive in both time and money. Remember that corrections to the galleys are made by hand, by picking out the unwanted metal letters and by replacing them with the correct ones. If a section is very heavily corrected it may be cheaper to completely reset that section.

We have recently run into a lot of extra expense with one of our manuscripts—an English translation of a Russian book on marine microbiology. When the translation first reached us I sent a copy of it to the author in Russia, who speaks some English, with the reasonable request that he let us have a note of any alterations within two months. During this time we ourselves were checking the manuscript and preparing it for the printer. No word or corrections came from the author so we sent the manuscript to the printers, and only when the first two chapters had been set did we hear from the author. He sent us a heavily corrected and altered manuscript. All his corrections have been incorporated, or at least those that we thought acceptable. At one point he wished to introduce the expression 'cleaning the backsides of slides'—this we deemed inappropriate. In fact, however, although his initial corrections arrived rather late and involved us in considerable expense and delay, our dealings with the Russian professor have always been cordial. He has been very helpful in other ways and the new material he has provided has much improved the book. The production of the book has been slow because two sets of galleys have been sent out, one to the translator and one to the author. The corrections on these two sets of galleys have finally to be amalgamated. At last, after about a year and a great deal of correspondence, the production of the book is near completion. When the finished book is in my hands it will be an exciting moment. We will print 1,500 copies to sell at approximately 5 guineas. This is not a high price when one considers that the book has some six hundred pages, we have had to pay a normal but quite high figure for the translation, we pay a 5 per cent royalty to the Russians, blocks for six pages of colour plates will cost £400, blocks for the other numerous illustrations will cost about £100, and the printer will have to be paid about £1,500, to say nothing of the cost of paper, binding (which will be about 3*s* per copy), and the other overheads which have to be met, with the exception of the royalty, before we have sold a single copy.

The page proofs are checked by the publisher and author. The index is prepared at this stage and we always ask our authors to do this. The quality of the index is important and we feel that the author himself is most likely to know which names, subjects, and concepts require listing. Indexing is, however, no small task. Professor Wynne-Edwards, whose book on animal dispersion we published recently, calculated that the preparation of the index alone took him more than 120 hours' concentrated work, excluding the correction of the proofs!

Once the page proofs have been passed for press the printer can at last go ahead with the printing. The printed sheets or at least those that are to be bound initially must then be passed to the binders for folding, collating, sewing, and binding. A publisher will not normally bind his total supply of printed sheets in the first instance. If he has printed too many copies he is better to have them left as sheets than to have incurred the additional expense of binding, and the inconvenience of having to find room for a large number of copies of the more bulky bound article in his storerooms.

So far the publisher has spent quite a lot of money in producing the book and now he must sell it. If he sells less than two-thirds of the copies he has printed, the whole operation as far as he is concerned may be financially a horrid loss. Let us therefore turn our attention to the publisher's sales and publicity department and see what they have been doing. In our firm they produce a jacket for each book. We have one or two artists in the area who produce designs and are more than happy to earn the £10 to £15 fee for doing so. This operation gives us quite a bit of pleasure, for it is satisfying to see one's book nicely presented in a well-designed cover. From the sales point of view there are many cases, of course, when it doesn't matter a hoot whether you have a jacket or not. For instance, one can say confidently that the sales of Dogiel's *Parasitology of fishes* have been totally unaffected by the presence of a jacket. On the other hand the sales of *What is relativity,* a small book with a popular appeal, may well have been affected considerably, because it is a book which is bought by the casual visitor to a bookshop.

I am attempting to give you some facts and figures to chew over today, so I might as well tell you, and you may be interested to know, that Dogiel's book was published about six months ago at a price of 4 guineas. Although it is a very specialized book it has got off to a good start. We printed 1,500 copies and have now sold one thousand of them. This figure includes a small edition of 250 copies taken by a cautious American publisher. With a book of this sort the majority of sales must come quickly and result from reviews, which are very important, and from direct mail advertising by booksellers and perhaps by the publisher, who may, however, suggest in his circular that the book be purchased from a bookseller. After the first six months sales will be slow. In this particular case the remaining five hundred copies will probably last about two years or more, so we appear to have printed about the right number. It is, however, often very difficult to gauge the market correctly.

Take for example Lapage, *Veterinary parasitology*. This is a university textbook and when the first edition appeared in 1956 we printed far too many. We printed six thousand, of which we have now sold 3,800 in a period of five and a half years. So far, therefore, we have had little, if any, financial return on this book. The trouble is that it is now in need of revision. So we will, in about a year, publish a new edition, and we will scrap almost all the remaining sheets. This time, however, we know how many copies of the new edition to print.

Landau and Rumer's *What is relativity* has now sold about 6,500 copies, 1,500 of these being the cloth-bound edition selling at 6*s* for libraries. The paper-bound edition sells at 3*s* 6*d*. We printed ten thousand and published it about eighteen months ago—so in this case our guesswork was quite good.

The publisher's publicity department prepares a catalogue which appears in the spring and autumn and gives information about the books that he will publish in the ensuing six months. Some publishers announce books which they think authors may be writing for them some time, and continue to announce them in their catalogues until the books are eventually published several years later or are finally abandoned. This habit I imagine you find very irritating.

The publisher's catalogue is sent out to booksellers all over the world and also to the library customers on his mailing list. For scientific and technical publications there are about thirty or perhaps forty booksellers in this country that matter, and about 70 per cent of our home business is carried out through a mere fifteen booksellers. Some of these booksellers, as you know, prepare catalogues of their own which have a wide circulation.

Some booksellers will make a special effort to sell particular titles through the mail by sending details of the books to names selected from professional membership lists or directories, and of course to people on their own mailing lists. This type of business is not necessarily very profitable. It costs about £10 to circularize a thousand people. Therefore, in order to make it worth his while, the bookseller must sell at least £50 worth of books to the few people from that thousand who reply.

The publisher himself also sends out circulars to people he knows will be interested. It is easy enough to get hold of the names of marine biologists to whom a circular about Dogiel's *Parasitology of fishes* can be sent. I imagine a fair amount of duplication or triplication of effort occurs here, and you may find that you receive information about one book you don't want, from the publisher and two booksellers, and no information at all about another book that would interest you.

The publicity department sends review copies to likely journals. Normally this means that about twenty to forty free copies are sent out.

We always attempt where applicable to sell editions of our books to an American publisher, and we are almost always successful. This means that the American publisher will buy sheets from us, or print his own edition, reproducing from our book by photolithography. In the latter case he will pay us a royalty, 75 per cent of which will go to the author, and a reproduction fee of perhaps £50 to £100 for the right to reproduce from our printing of the book. The selling of an American edition helps to keep the price of a book down. If sheets are sold it may mean that the printing number can be increased from, say, 3,000 to 4,500. Once one has set up the type and made ready, the actual printing takes relatively little time and is not very expensive. The actual cost, therefore, of running on an extra 1,500 sheets is quite small, in fact mainly the cost of the paper, and when all the costs are distributed over the larger number the cost per sheet will be very much reduced. If for a three thousand printing the cost per sheet is 15*s*, then for a five thousand printing the cost per sheet might be 11*s*. A publisher is heading for bankruptcy fast if he succumbs to the temptation of printing too many sheets in order to try to keep the price of a book down.

There are many other publicity and sales activities, such as the visits made by publishers' representatives. They may visit only the trade and some libraries, or they may spend much of their time visiting universities and colleges. The American publishers concentrate particularly on the university and college-type representative. Sometimes these gentlemen annoy the staff and the librarian by sending books on approval which have never really been asked for. But they do sometimes make useful contacts for their publishers, and I think we shall find that some British publishers will start adopting this type of representation.

The sales department must also negotiate for the sale of the translation rights of our books. This is by no means always possible, but Fisher's *Design of experiments* has been translated into Japanese, Italian, Spanish, French, and German; Cooke-Yarborough's *Transistor circuits* has been translated into French; Folley's *Lactation* into Russian; and Auerbach's *Genetics in the atomic age* into Swedish, Portuguese, German, Japanese, Polish, Italian, and Russian. I must say to the credit of the Russians that negotiations for translation rights consume none of our valuable time! The first we know about it is that the book appears in Russian, and it is not an easy task to obtain any royalties for one's author.

The publication of scientific school books presents, production-wise, problems similar to those of the more advanced textbook. The printing number, of course, is very much greater and therefore the price is lower. We have five educational travellers who spend their whole time visiting schools, attempting to introduce our school books to the teachers. A new series entitled *Science from the beginning* is an example. Our printing numbers for each of the pupils' books is fifty thousand, each book sells at 6*s*, and our profit margin is slight. We are banking upon having to reprint and there are now signs that our faith in the series is justified. With books of this sort, if you do not reach the reprint stage you may have been better not to publish—you will merely have involved yourself in a massive amount of work for no profit.

I think I should say something about the journal. The success of a journal depends in very large measure on the editor. He must be a person devoted to the task, intent upon maintaining a high standard in each issue. He must be hardworking and fast-working, yet have an eye for detail.

A well-trained editor will pass to a publisher, or to the printer if the editorial board manages its own affairs, copy for each issue of the journal which is scientifically accurate and will need relatively little marking up before being passed for setting. The publisher will have to arrange for the placing of illustrations, sizing up of blocks, and for the redrawing of the illustrations where necessary. He will also have to check through the text to ensure that the editor is not demanding of the printer anything which is just not possible in type.

The number of reprints of each article will have to be considered.

Many journals are owned by societies, but the societies often find it convenient to place the management of a journal in the hands of a publisher. Apart from the functions I have already described, the publisher will have to maintain a list of subscribers, and stock and sell back numbers. For this he will normally receive a commission varying between 15 per cent and 20 per cent of the price realized on all orders. Any profit over and above that is passed to the coffers of the society. It is only fair to point out that any loss is also the responsibility of the society.

For a quarterly or semi-annual journal it normally takes about four to five months from receipt of copy to publication.

Let us take for example the *Journal of Pathology and Bacteriology*. This has five scientific editors who are only paid their expenses. The *Journal* is owned by the Pathological Society of Great Britain and Ireland, but we took over the management in 1917 when it was in financial difficulties. The *Journal* now makes quite a fair profit and the society are happy to see that they have a considerable credit balance at the bank. Circulation is nearly four thousand. It appears quarterly, and each issue is fairly large. An issue may contain as many as eighty plates, some of which are in colour, and four hundred to six hundred pages. The selling price of each issue is only 25*s*.

Another example is the *International Journal of Abstracts, Statistical Theory and Method*. It contains abstracts of papers and has a world-wide coverage. The *Journal* is owned by the International Statistical Institute. We were given $15,000 to start the *Journal*. This money we used for initial publicity, experiments in design, specimen pages, etc. In fact we only found it necessary to use about $10,000 for this purpose, the remainder being returned to the Institute. The *Journal* started publication two years ago. After six months the number of subscriptions had reached 750 and the number now is 1,100. In the course of time we expect the number of subscriptions to reach 1,500. Subscriptions for a journal of this kind are initially obtained by sending out prospectuses, through booksellers, direct to individuals, or by enclosing the prospectus in another similar periodical.

Another example is the journal *British Poultry Science*. This is owned by a society and started publication two years ago. Circulation is now about seven hundred. In the first year a loss was recorded in excess of £100 but in the second year a profit was shown. The number of subscriptions will probably rise to about a thousand.

Sometimes a publisher may feel that journals involve him in a lot of detailed work for a rather small commission. On the other hand, a journal can provide very good contacts for a publisher, and very often one finds that the publisher of a journal also has a good list of books in this field. These books, in all probability, have derived directly, or indirectly, through his association with that journal and its editors.

LIBRARY BOOKBINDING: STANDARDS AND DEVELOPMENTS

DAVID MONCUR
Dunn & Wilson, Bookbinders, Falkirk

Scottish Branch Conference, Perth, 16th–17th March 1962

SPECIALIZED LIBRARY BOOKBINDING

THE demand for specialized library bookbinding was created by the need to rebind the books lent free of charge by burgh and county libraries. Publishers' bindings were certainly not strong enough to withstand the wear and tear of public library usage and the authorities could not afford to purchase replacement copies. Traditional methods of binding such as half-leather with laced-in boards were much too costly for the libraries' limited funds.

Cedric Chivers of Bath was the first binder to produce—in 1883—a specially constructed, durable binding at an economical price. Although binding techniques on the cheaper lending library books have changed in recent years the best reference bindings of today incorporate the characteristics which Chivers originated. These consist of the following features:

The axiom that no leaf should carry more than itself. It is bad practice to paste plates, charts or endpapers to the leaves of a book.

A specially constructed cloth-jointed endpaper which is sewn on with the book.

A French joint was devised to overcome the strain which is put on books at their weakest part—the joint. It permitted a freer opening and the use of a heavier covering material.

The use of split boards into which the sewing tapes and the overlap of the first spine lining were inserted ensured a very strong method of attaching the book to its cover.

Quarter pigskin or goatskin and buckrams were used as covering materials.

Other binders then entered this particular branch of binding. Riley of Huddersfield, Blunt of London, and Dunn & Wilson of Falkirk were the largest firms and for many years this sound specification prevailed. The style became typical of library binding.

In 1919 an Act was passed which removed the limitations on library incomes and this resulted in a vastly increased amount of rebinding from public libraries. The large firms became more than ever specialized. The subdivision of labour, the introduction of labour-saving systems, and light machinery invented by the various firms—all contributed to a healthy competition. These books were bound to last and they did, but during the past thirty years or so great changes have taken place in library bindings as such. The fundamental conditions or requirements of lending library bindings have altered. The leather bindings of fifty years ago were too strong and outlived the life of the paper upon which the average lending library book is printed. The books became dirty long before the leather wore out and assumed a somewhat dowdy appearance on the shelves. It was no longer considered desirable to have bindings that would last for ages, at least as far as lending library books were concerned. Weaker endpapers, lighter boards, and leather substitutes were the order of the day.

During the depression of the 1930s library book issues took a great leap forward which was particularly noticeable in the areas of unemployment. Because of keen competition, some of the smaller firms resorted to price-cutting, with which went the inevitable reduction in quality of materials and workmanship. Gradually, mass-production methods were applied by the larger firms in the rebinding of fiction and non-fiction books. Although the standard of specifications was lowered, the bindings were still superior to those of the publishers and undoubtedly most of these bindings met the requirements of librarians. There was no doubt that mass production was the only factor which kept prices low during a period when all other charges were rising. No longer were librarians forced to keep books in circulation long after they should have been withdrawn.

There was also in the mid-1930s a campaign by the library profession to introduce brighter bindings into the public libraries. The dull, drab appearance of so many plain-coloured cloths and buckrams militated against the popularity and success of the library. The lending departments represented a large colour space which, if brightened, would add attractive decor to the library even if its walls were somewhat dismal. Library binders were willing to assist in the scheme and brighter coloured cloths, buckrams, and rexines played their part although some of the cloths faded or dirtied rather quickly.

Nu Craft bindings, for which assistant librarians were invited to submit cover designs, proved most popular. The all-over designs were printed in coloured inks on best quality rexine. Cloth jointed endpapers and split boards were retained. Some of these bindings are still to be seen on certain library shelves. The outbreak of war in 1939 brought production difficulties and these most attractive Nu Craft bindings had to be discontinued. During these years there was a tremendously increased demand for rebinding but cheap boards and inferior book cloths only were available.

Since the second world war there have been further changes and developments in lending library binding styles. Publishers' attractively printed dust jackets, primarily designed to appeal to the book buyer, were used to appeal to the book borrower. By themselves they quickly became dirty, tattered or torn; however, when protected by a plastic film and reinforced to form a sleeve into which the book boards could be inserted, they presented a revolution in lending-library binding. Millions of these plastic sleeves now adorn books on library shelves. The fresh, clean appearance of these jacketed books ensures their popularity with the borrowers, who, according to issue statistics, show a definite preference for glossy pictorial covers. These sleeves cost from threepence to sixpence each. Of the lending books which were sent to the bindery there was very soon a demand for something with more visual appeal than plain-coloured buckrams and rexines. It had been found that few readers would investigate the contents of plain cloth bindings if bright attractive covers were available.

The large library binding concerns have striven hard to produce brighter bindings and have met with considerable success. Patterned cloth with tweed or polka dot effects and coloured title panels lettered in contrasting coloured foils are quite popular but the demand for film-protected pictorial bindings still continues and today the most sought-after bindings for fiction and non-fiction are those which incorporate the publisher's dust jacket.

The advent of paperbacks has opened up an entirely new field with a terrific potential for library binding. Few librarians would place paperbacks, as such, on their shelves, since within a very short time they would assume a grubby look and spoil the appearance of the library.

Dunn & Wilson pioneered what was known as Penguin style binding, thus called because at the outset Penguins only were dealt with in this manner. This particular binding style utilized the unsewn or so-called perfect binding method, with the usual round and joint and cased-in hard covers; these comprised boards and hollow, mounted on the original paper cover, which in turn was covered with the much desired plastic film. The term 'covered in plastic film' may sound all too easy, but there was a tremendous amount of experimentation by trial and error to find not only the most suitable film but also the best method of application. Trial batches were sent to libraries in many different parts of the country. The end result was a guarantee that these books would withstand fifty issues or two years of library use.

Almost any series of paperbacks is suitable for this style. The progress made in adhesive technology has strengthened the case for unsewn binding. Machine-finish printing papers commonly used in paperbacks are ideal for this treatment but binders of repute would hesitate to use it on books of permanent value. Polyvinyl acetate adhesives are now used for many of the operations in bookbinding; although they are more expensive than animal glues they have many advantages which cannot be overlooked. Adhesion problems which used to beset the binder no longer exist. Drying time, tack, and flexibility are all controllable by varying the amount of solvents and plasticizers. Even the moisture content in paste which caused board-warping difficulties has been overcome by the use of polyvinyl acetate emulsions.

From what I have said about the treatment given to paperbacks it is obvious that the number of bound books going into our libraries is ever increasing. The library binder who is prepared to adapt his methods and his bindery to meet the requirements of the public libraries has an ever-expanding market.

JOURNAL AND PERIODICAL BINDING

Industry after industry is setting up research centres, whose libraries have an ever-growing collection of journals, periodicals, technical records, and specialized papers. In these special libraries the need for binding grows each day and might well exceed, in quantity, the rebinding of books with publishers' hard covers. One requirement in this rapidly expanding field of technical and scientific libraries is that bindings should be permanent. Whereas standards of library binding in other classes of books may have been diminishing, here is a class of work in which quality is important and price not such a serious consideration.

In Great Britain the standard of periodical binding varies. Few binders need to adhere to a specification. Some binders do give a traditional library binding specification, using the very best of materials, but there are many periodicals bound merely as cased books using strawboards and inferior covering materials. All too often the customer gets poor value for the money spent, having received what may be termed a semi-permanent binding.

This age of science and technology has brought forth a surge of new periodicals, journals, and records in many countries, in particular America.

The library binding industry in America is represented by a highly organized trade association called the Library Binding Institute, whose members are certified library binders. The concept of the certified library binder is founded on a basic Library Binding Institute standard of specification. Binders are pledged to a high standard of quality, service, and a fair deal. The Institute has certainly done a great deal to further the interests of its members. It promotes well-planned advertising schemes which tell the library world of the benefits to be derived from dealing with certified binders. Amongst these are shown convincing statistics on how budget saving can be effected. The specification of what is called standard binding was a joint effort of binders and librarians and is a guarantee that a sturdy, clearly lettered product is available for library use; the specification—which is rigidly adhered to—was drawn up to protect libraries from binders unable to meet the standards required by library wear and tear.

The fundamental differences between American periodical binding and our own are:

1. The absolute acceptance by librarians of oversewing.
2. The absence of split boards.
3. The use of one covering material in a limited number of colours.
4. The standardization of the positioning of spine lettering.

The fact that practically all American library binding is oversewn effects an immediate saving, as the time-consuming operations of taking down and then reinforcing each pair of weakened leaves is unnecessary. Whilst oversewing is undoubtedly strong it can be objectionable, and in fact will not be accepted by many British librarians if it can possibly be avoided, for the following reasons:

1. A percentage of the books will not lie flat when opened.
2. The forcing open of stiff papers or soft bulky papers causes the threads to tear through the paper.
3. The spine margins are reduced if the binder cuts off the back folds to create single leaves. This is done to make sections of suitable uniform thickness for the oversewing machine. For economic reasons no allowance is made by the printer for this to happen and very often the margins are narrow enough as they are.
4. If in the future the book should require resewing and rebinding, $\frac{3}{8}$ in. (the width of the sewing) has to be cut from the spine.

American oversewing machines are used in this country, and sometimes they are the only answer to the binder's problem in sewing books which are printed as single leaves or in periodicals where the removal of advertisements has created so many single leaves that to join them together is impracticable. However, to avoid complaint from the librarian one must ensure that only that type of paper which lends itself to the oversewing method is used. Failure to observe this factor has been chiefly responsible for the dislike in this country of machine oversewing.

Split boards have long been accepted as one of the strongest methods of attaching the cover to the book when the sewing tapes and the spine's first lining are glued into the split. Again these are time-consuming operations which the Americans have abandoned in favour of what is virtually a cased book. They reinforce the spine with a close-woven fabric, and this and the cloth-jointed endpaper join the book to the cover. By using heated groove metals in pressing, perfect adhesion at the joint is attained. This is essential for strong casing.

In library binding it is false economy to use a cheap bookbinders' cloth. Usually buckrams and rexines are used. They may cost about twice as much per yard, but this amounts only to a few coppers per cover. In this country the large firms are expected to carry heavy stocks: rolls of cotton buckram, library cloth, or washable buckram; also rexines, smooth and grained. In order to give a good selection of colours and shades, and so that patterns which may have been bound by another binder can be closely matched, the binder may stock as many as twenty colour shades of each of these materials. In America one material, which is a good pyroxilin-impregnated buckram, is to be had in a limited number of colours only.

It is, however, in the standardizing of spine lettering that the American library binder is quite different from the binder in this country. Only the largest British firms could compete in the actual lettering operation. All American binders have typesetting machines and efficient blocking machines with specially designed chases to hold the lines of type. In this country the binder will take considerable care to ensure that the lettering matches the pattern in character, height, and spacing, or, in new work, that the librarian's suggested layout is followed. In America the books or periodicals are grouped according to height into five sizes. Periodicals from, say, 11⅛ in. to 12¾ in. high would have the top line of their titles at 10 in. above the bottom of the spine. In all sizes between 9 in. and 15 in. the volume number would be 5 in. from the bottom of the spine. The abbreviation for volume is omitted. The months and years would be 3½ in. and 3 in. respectively from the foot of the spine. Decorative lines and leather title pieces are non-existent. The spaces between the lines of type are uniform, whereas we will vary the spacing to make the title more pleasing to the eye. Standardized lettering certainly is a time saver in the bindery and minimizes the keeping of rubbings, or records, and probably saves the librarian's time. Americans state that this standardization of lettering greatly improves the appearance of bound magazines in libraries, which I doubt very much. I say this having visited some beautifully furnished libraries, and never have I seen row upon row of so many uninteresting bindings. I know many librarians in this country who are proud of the appearance and tradition of their libraries and just would not accept these conditions.

One gets the feeling that the American library binder has educated his customer in order to facilitate his production lines which, incidentally, are very alike throughout the country. It was one of the highlights of my visit to see such wonderful flow lines. Obviously much money and effort had been directed to at least the semi-automation of most of the operations, but there was always just that slight lowering of standards—books not opening as well as they should; books not so solid as they might be; too many books with poor rounds and blunt joints.

Having seen the best of two worlds, so to speak, I have no hesitation in saying that the American standard binding is not as satisfactory as the best done in this country. Certainly their mechanization has increased productivity tremendously, and binding charges in ratio to labour costs are the lowest in existence. But many would question the need for the lowering of standards of workmanship on a class of book which will be permanently housed in attractive modern libraries, whether they be reference departments of public libraries or those of our industrial or research organizations.

Letters to the Editor

'CONCEPT CO-ORDINATION'; OPTICAL STENCIL ('PEEK-A-BOO') DEVICES

Dear Madam,

Mr Tams complains that little has been said about working principles for constructing systems using 'concept co-ordination' descriptions or systems employing optical stencil devices for detecting joint membership of classes, such as Taylor ('Peek-a-boo') cards.* Much has been written about both of them.

The two are not equivalent; use of one on the intellectual level does not entail use of the other on the clerical level, nor conversely. Mr Tams, for instance, is using the second but not the first. Instead of co-ordinating concepts or notions, he is co-ordinating the occurrence of certain words in the texts. Just as did Unitermites (as they were unkindly called by sceptics) some nine years ago, he runs into the same embarrassments that must follow confusion between, say, Mary as a girl and Mary as a four-letter word.

It appears from his letter that when an item is entered or sought as having, say, 'Steel', as a component, this may be because it has the attribute 'Containing in its text the word "steel" ' or it may be because it has the attribute 'Of interest in some way to users concerned with the broad concept of (suitably qualified†) ferrousness.' Documents or requests that have the first attribute do not necessarily have the second, nor do those with the second necessarily have the first. His references to the English language and traditional linguistics suggest that he has not quite grasped the vast distinction between description of subject interests by notions or concepts as descriptive elements, and their description by isolated occurrences of dictionary words in the text. Unless he does so he will end with a card for each word, phrase, sentence, paragraph, in each language —English, French, Russian, etc.—that his users are interested in.

There is a vast literature on all aspects of this matter, running back a decade or so. Fortunately two recent publications summarize it, expound established principles, and illustrate them with case histories. One, *The state of the art of co-ordinate indexing* (February 1962), is obtainable from the Document Research Program, Office of Science Information Service, National Science Foundation, Washington 25, D.C. The other, Herner's *Methods of organizing information for storage and searching,* presented at the State of the Art symposium held at Boston by the American Documentation Institute last November, is printed in *American Documentation,* vol. 13, no. 1, January 1962, pp. 3–14. Also it, together with other papers of the symposium, is published as a 'separate', obtainable for $7 from the Institute's Secretariat, 1728 N Street, Washington 6, D.C.

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* *Aslib Proceedings,* July 1962. † I am not a metallurgist. RAF.

Fairly widespread perusal and digestion of these two documents might do something to reduce the current gap between United Kingdom and USA understanding and practice of such methods.

The matters discussed above are intellectual, and therefore inaccessible to office machinery and devices, however simple, reliable, swift, or ingenious. Always we must keep strictly distinct problems of description and recognition, of organization, and of clerical tools. The first concern themselves with such matters as joint attributes, vocabulary profiles, nested topics, thesauri, description by users' names or types, and the like. The second with, for instance, inverted files, arbitrary or linear access, alphabetical arrangement and, in general, formal and conceptual organization of material and processes. The third concerns physical realization by mechanization, copying devices, human dexterity and memory, printed books, data processing devices, and the lot, including Taylor cards for detection.

These aspects are fundamentally independent, though clearly the last dictates what is feasible at any given time and place. If you are compelled or determined to use Taylor cards, you are compelled to describe and select primarily in terms of common membership of classes. But what classes of what members is up to you. Just having Taylor cards or any derivative of them, however elaborate, will not give even a clue to the answer.

The optical stencil, or sieve, is an extremely fertile idea of considerable antiquity and with many variants and applications. Also, even in the documentation application, it is very well documented. Nevertheless the following comments, though not novel, may help those meeting this tool for the first time.

The basic characteristic of optical stencil devices for human inspection is that they are excellent detectors, but poor identifiers. Anyone can see a point of light; to find what document it represents, let alone the contents or description of that document, is another matter.

The original Taylor cards (US Patent 1165465 of December 1915) selected from only a few species of birds; round about a hundred, in the only set I have handled. This permitted apertures* large enough to reveal the printed name of the appropriate bird when the cards were placed in register over a master card.

For larger or more complexly invoked collections the apertures must be much smaller, or the cards much larger, or more numerous. Though Wildhack and Stern of the National Bureau of Standards spent much time and ingenuity making an ultramicrophotographic equivalent of the Taylor printed master card, they have found a less direct approach more successful. (See, for instance, *Current Research and Development in Scientific Documentation,* no. 9, National

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* Mr Tams' comment 'Later W. E. Batten substituted punched holes for the crosses' is puzzling, and possibly confuses the Taylor patent with earlier devices. Taylor used apertures, as did many inventors of variants between 1915 and 1946, when Batten rediscovered the principle independently; and indeed thereafter. It is one of the most frequently rediscovered of methods. The outlines of its history, and a study of its principles, development, and application, are given by Wildhack and Stern in 'The Peek-a-boo system; optical coincidence subject cards in information searching', which is chapter 6 of Part 2 in *Punched cards*, edited by Casey, Perry, Kent, and Berry, 2nd ed. (New York, Reinhold; London, Chapman & Hall, 1958). Other chapters in this book deal with some descriptive problems troubling Mr Tams.

RAF.

Science Foundation, November 1961.) However, whatever the means used to make optical stencils retrieve as well as detect, they must increase the capital cost of the system some thousandfold.

Thus ideally such systems should be used not for retrieval, but to indicate non-existence (more accurately, alas, non-description in the terms sought) of items of stated specification. This is unduly restrictive, but clearly optical stencil systems work the better the rarer the items sought, and the more immediately accessible they are to the individual seeker. Since most mechanized systems work best when most of the items processed are those required, this gives the optical stencil an advantage if dealing with novel and unusual combinations of requirements that are unlikely to be fulfilled.

Requests that are liable to produce a numerous response, or to be modified in the light of the previous response, are best dealt with by, say, a notched card system in which the cards carry some representation of the item, and the notches represent joint occurrence of some of its attributes, terms, or features.

Descriptive and linguistic problems of indexing and invocation are, of course, the same with both devices.

Yours truly,
R. A. FAIRTHORNE

Farnborough, Hampshire
31st July 1962

Dear Madam,

I was very interested to read the letters of Mr Rae and Mr Tams about the concept co-ordination ('Peek-a-boo') system in your May and July issues respectively, as I am at present indexing a set of technical reports by this method. 'Peek-a-boo' is well suited for indexing reports, of course, as these are often filed in numerical sequence and no intermediate serial register between punched card and document is then necessary.

Surely Mr Tams is going to extremes, however, in breaking up common technical words such as 'electroplating' and 'electromagnetic' into their component syllables. When drawing up our list of subject headings we could see no advantage in splitting up such terms as 'hydrochloric acid' into 'hydrochloric' and 'acid', or 'direct process residue' into 'direct', 'process' and 'residue' or 'vapour pressure' into 'vapour' and 'pressure'. We could see no justification for the proliferation of cards, the extra labour of punching and the increased complexity of retrieval.

Our approach has been to use subject headings which fall clearly into one of four main categories, viz. Materials, Properties, Processes and Uses. Thus we have a card for 'direct process residue' which is a material and another for 'direct process' which is a process. Had we a card for each of the constituent words, i.e. 'direct', 'process', and 'residue', it is obvious that reports on the direct process (for manufacturing chlorosilanes) could not be identified by superimposition of the cards for 'direct' and 'process'. Such superimposition would retrieve a mixture of reports on both the process and its residue.

In situations where ambiguity owing to word order could arise, e.g. in Mr Tams' example of 'Steel for trucks' and 'Trucks for steel', two solutions present themselves. Firstly, the fairly obvious one of completing the categorization of terms:

Material:	Steel	Trucks
Properties:	—	—
Process:	(Manufacture)	(Transport)
Use:	Trucks	Steel

Secondly, the use of a second card or more to distinguish the role of the keyword, e.g. Steel (as raw material), Steel (as finished product). The latter is the system used by the American Institute of Chemical Engineers who employ a special 'roles' code.*

I think I should add that the above contribution is based on a limited experience of 'Peek-a-boo' in a rather specialized technology. Perhaps we could hear from those who have used this scheme extensively over a wide subject field.

Yours faithfully,
for Midland Silicones Limited,
J. M. KEANE,
Information Officer

Barry, Glamorgan
2nd August 1962

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* Morse, R. Information retrieval. *Chemical Engineering Progress,* vol. 57, no. 5, May 1961, pp. 55–8.

A SCIENTIFIC INFORMATION OFFICE

Dear Madam,

With the field of scientific and technical information its dissemination and services brim-full of problems and in dire need of vigorous discussion, reporting and action in this country, the current issue of *Aslib Proceedings* made pretty dull reading. My look through it noted only a letter on 'Peek-a-boo' retrieval which did not seem worth printing. If we are going to join the Common Market, which some of the issue was concerned with, we had better wake-up our ideas in the documentation field. Notes and articles in journals and in the press, commenting on the information problem and our backwardness, are becoming more frequent, e.g. the current *Marconi Technical Review.*

Is it not high time that someone in a position of influence in science, technology, or information work initiated some non-partisan action—at a high level? Take a look at the position in the USA as shown by the 280-page report *Documentation, indexing and retrieval of scientific information—a study of Federal and non-Federal science information processing and retrieval programs* by the Senate Committee on Government Operations (Document 113, 86th Congress, 2nd session, 1961, 70 cents). (Perhaps Aslib should make sure that Lord Hailsham is sent such publications.) We need British equivalents of the National Science Foundation and its Office of Scientific Information Services, of the Science and Technology Division of the Library of Congress (though it is under heavy fire at home), of the National Federation of Science Abstracting and Indexing Services (NFSAIS) and of the Armed Services Technical Information Agency (ASTIA). The rapid progress being made in the USA is in large measure due to the national leadership of the National Science Foundation assumed as a result of legislative and executive action in 1958 and 1959.

Cannot we make a start by lobbying the Minister and the DSIR-sponsored Committee on the Dissemination of Scientific Information, to set up an Office of Scientific Information, housed at the National Reference Library of Science and Invention. The Office to be responsible to the Minister of Science, the Advisory Council, or a Science Council set up by the Minister — not to DSIR or the British Museum—to promote, co-ordinate and stimulate the scattered, incoherent, unco-ordinated, often uninspired and mostly unknown efforts of the many bodies concerned with problems in this field. The advisory Council on Scientific Policy, the Royal Society, DSIR, the scientific and professional institutions, Aslib, the Library Association, the British Association for the Advancement of Science, the Patent Office, the British Museum Library (Science Division ?), the Institute of Information Scientists, the Atomic Energy Authority, the British Standards Institution, the Central Office of Information, Board of Trade, Technical Information and Library Services of the Ministry of Aviation, War Department, Admiralty and Air Force (?), Science Abstracts, the BBC, the Ministry of Education . . . a survey on the lines of the aforementioned Senate Committee's report could reveal all the agencies their activities and responsibilities, but a go-ahead Office of Scientific Information empowered by the Minister to give a lead like the NSF would soon collect enough data to open the way to co-ordination, reorganization and progress.

The Committee set up last year by the Council of DSIR to investigate 'the dissemination of scientific and technical information' may actually be about to publish such a survey (I suspect not though), but the rank and file of information workers, librarians and scientists are really getting no information on what, if anything, is going on. The little information that becomes available from time to time scarcely inspires any hope of real progress in this country in attacking the problems of the 'information explosion', in the short term by organization and co-ordination, and in the longer by investigations, research and development.

Perhaps this letter might encourage Aslib to think of publishing more 'news'—good documentation reporting and campaigning would be of more value perhaps than some of its research. I hope it might 'stir up' something, even evoke some statement from the aforementioned DSIR committee, or 'news' from one of its members, whose names and activities have not been 'disseminated'. So many things need airing and tackling—e.g. training information workers; training in the use of literature in universities, colleges, schools; planning the National Reference Library of Science and Invention and its possible role in a real national reference and information service; the need for co-ordination, reporting and stimulation of research and data collection in documentation; appraisal of information storage and retrieval and mechanized indexing systems for application to services in real need of them, e.g. Science Abstracts, and report documentation services such as TIL, ACSIL, War Department and Air Force which want streamlining into one effective organization.

The Minister of Science has pointedly said that our backwardness in this field is not solely a matter of finance, there is a lack of ideas. Maybe, of course, he should before now have provided the initial drive and finance to bring in men of ideas. However, if some of the veils of silence, pomposity, timidity or vested interests were rent a bit, some ideas would certainly emerge as a result of the improved communications and open discussion, but some kind of Office of Scientific Information must be set up by the government with some of the resources of our 'expanding economy', to exercise the necessary leadership on the lines of the NSF. Its establishment could be a means of attracting into this field of scientific information and administration men from science or technology with the talents, drive and vision which are maybe lacking today.

Yours sincerely,
L. CORBETT

UKAEA
2nd August 1962

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AMERICAN LIBRARY ASSOCIATION. Library Technology Project
The testing and evaluation of record players for libraries: a report based on a study conducted for the . . . Project by Consumers' Research, Inc. [Chicago], 1962. viii,76 p. (LTP Publications, no.5). $2.

AMERICAN UNIVERSITY. Center for Technology and Administration
Machine indexing: progress and problems. Papers presented at the Third Institute on Information Storage and Retrieval, 13–17 February, 1961. Washington, [1962]. iv, 354 p. $7.75.

ASLIB. Northern Branch. *Conference, Liverpool, July 6/7th* 1962
Desirable ratio of professional and non-professional staff: paper by Geo. H. Davison. . . . [Liverpool, 1962]. 25,[1] p. tables.

BRITISH INSTITUTE OF MANAGEMENT
Collection and communication of commercial information within companies. London, July 1962. 28 p. tables. (Information summary 101).

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*DEUTSCHER NORMENAUSSCHUSS, *and* FORSCHUNGS–INSTITUT FUR RATIONALISIERUNG AN DER RHEINISCHWESTFALISCHEN TECHNISCHEN HOCHSCHULE, Aachen
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Anleitung zur Programmierung des Flexowriters, von H. H. Bernstein. . . . [Instructions for programming Flexowriters]. Brussels, 1961. 51 p. (Rapport DOCA No. 2). (Suppl. provisional French translation).

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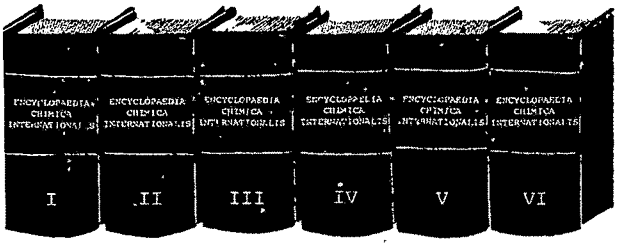

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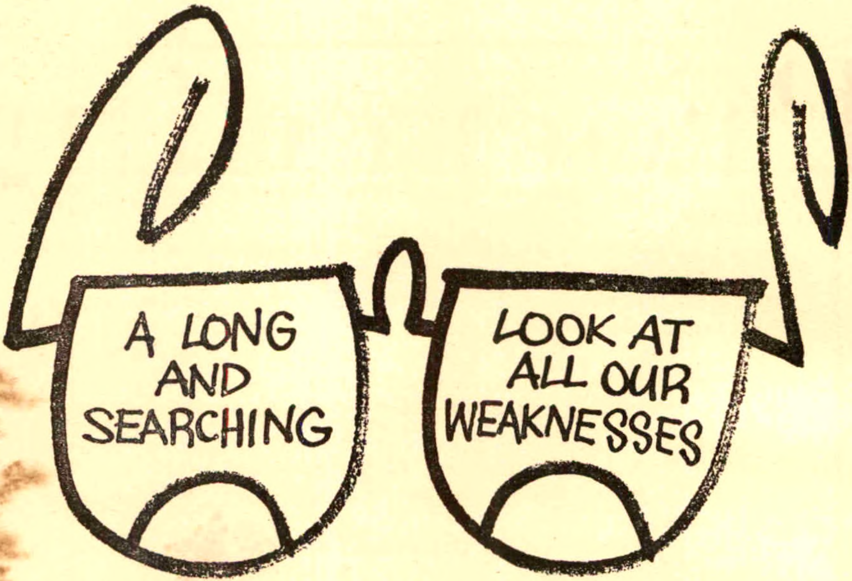
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THUR.18 – FRI.19. Course on photographic copying in the information department, at Dagenham.

MON.22. Winter meeting at Aslib. 'Technical information services to a craft industry' by Norman R. Hood.

TUE.23 – FRI.26. Junior introductory course to information work.

November

THUR.8. Technical Translation Group sherry party.

FRI.16. Northern Branch conference in Bradford. See paragraph below.

TUE.20. Economics Group conference.

WED.21. Aeronautical Group winter meeting at Farnborough. See paragraph below.

THUR.22 – FRI.23. Scottish Branch second course on information work, in Edinburgh.

MON.26. Winter meeting at Aslib. 'The implications to industrial and other special librarians of the new L.A. examination syllabus' by L. G. Patrick. See paragraph below.

THUR.29 – FRI.30. Course on using foreign languages in information and library work. See paragraph below.

December

TUE.4. Midlands Branch meeting.

THUR.6. Technical Translation Group meeting at Aslib.

WED.19. Christmas sherry party at Aslib.

March 1963

MON.25. Midlands Branch annual general meeting.

April

FRI.5 – SUN.7. Aeronautical Group and Engineering Group joint conference at Cranfield.

WED.17. Course on reference work at North-Western Polytechnic begins.

June

FRI.14 – SUN.16. Electronics Group annual conference at Ashridge College.

Winter Meetings

The next Aslib winter meeting will be held on Monday 22nd October, when Mr Norman R. Hood will be the speaker. Dr H. F. Rance, Technical Director of Wiggins Teape Research & Development Limited, will be in the chair. Other details were announced in the September issue of *Aslib Proceedings*.

The following meeting will be on Monday 26th November, and the speaker will be Mr L. G. Patrick, F.L.A., Librarian of Aluminium Laboratories Limited, Banbury, on 'The implications to industrial and other special librarians of the new Library Association examination syllabus'. The chair will be taken by Miss L. V. Paulin, M.A., F.L.A., who is the Hertfordshire County Librarian and Chairman of the Library Association Education Committee. Mr Patrick's paper will deal with the revised Library Association examination syllabus, which is to be introduced in 1964 and which will have important implications for special librarians. Mr Patrick will discuss pre-entry qualifications and the selection of candidates for training, the revised syllabus itself, the functions of the library schools and facilities for training, and the needs of employers—all from the special library viewpoint. While he will draw attention to as many significant matters as he can, open discussion will be particularly helpful in clarifying the implications of the new provisions and it is hoped that many Aslib members will take this opportunity of putting forward their views. The meeting will take place at Aslib, 3 Belgrave Square, at 6 p.m., and tea will be served from 5.30 p.m.

A Christmas sherry party will be held at 3 Belgrave Square, London SW1, on Wednesday 19th December 1962, from 5.30 p.m. to 7.30 p.m. Admission will be by ticket and details will be announced later.

Plans are being made for a meeting to take place between the 20th and 26th of each month from January to June 1963, and it is hoped to circulate a programme with the December issue of *Aslib Proceedings*.

Northern Branch

The Branch is holding a one-day conference on Friday 16th November. It will begin at 11 a.m. and will take place in the Textile Lecture Theatre, Bradford Institute of Technology, Bradford 7. The speakers will be Mr G. M. Boyd, of Lloyd's Register of Shipping, on 'Indexing methods adopted by Lloyd's Register of Shipping'; Mr L. Taylor, of Ferranti Ltd, on 'The library's function within the company structure and its responsibility towards research, production, marketing, administration, finance, and training developments; also whether it is a luxury or an essential service'; and Mr R. Sewell, of United Steel Companies Ltd, on 'What are the language requirements of the ideal information officer'.

Details will be sent to Branch members in due course. Non-members of the Branch who would like to attend are welcome to write to the Honorary Secretary, Miss E. Boddy, at Edgar Allen & Co. Ltd, Imperial Steel Works, Sheffield 9.

Aeronautical Group

The annual winter meeting will be held on Wednesday 21st November at the Royal Aircraft Establishment, Farnborough. Mr R. A. Fairthorne, lately returned from a year as visiting research professor in the Center for Documentation and Communication Research at Western Reserve University, Cleveland, Ohio, will be speaking on 'Personal impressions of some USA documentary activities, 1961–62'. The programme will include visits to research laboratories and to the main library and some documentary films about the work of the Establishment.

Visitors by train (leaving Waterloo at 9.27 a.m.) will be met at Ash Vale Station at 10.22 and taken back there to catch the train leaving for Waterloo at 4.49 p.m. Those wishing to attend should notify Mr R. C. Wright at the Royal Aircraft Establishment, Farnborough, Hampshire.

Using Foreign Languages in Information and Library Work

Important information may be published in any of a large number of languages and, unless librarians and information officers are able to cope with publications in these languages, it may be lost to their users. Some of the ways of dealing with this problem were discussed in the recently published study of *The foreign language barrier in science and technology* made by the Aslib Research Department. A two-day course to be held at Aslib on Thursday and Friday 29th and 30th November will help librarians and information officers to make the best use of the knowledge of foreign languages, actual and potential, that can be drawn on from their staffs. The course will open with a discussion of the implications of the Research Department's study, and other topics to be covered include transliteration, technical translations, the organization of a translation department, and indexes and pools of translations. There will be a small exhibition of technical dictionaries and language-study materials. The fee for the course will be 5 guineas. Applications to attend should be made on the form enclosed in this issue.

Language Symposium

The Institute of Linguists and Britain in Europe are sponsoring a one-day symposium on 'Language matters: the importance of languages in the European context', which will be held at the Connaught Rooms, London WC2, on Wednesday 21st November 1962.

Sessions will include 'The importance of languages in the European context'; 'Selling abroad and the language problem'; 'Translating, interpreting and the commercial requirements'; and 'Modern language teaching for the modern society', at which Mr Leslie Wilson, Director of Aslib, will take the chair, and Mr Peter Newmark, Head of the Department of Modern Languages at the Holborn College of Law, Languages and Commerce, will be the speaker.

International Building Classification Committee

The eighth plenary session of the IBCC took place in Cambridge on 4th and 5th September. The Committee, established in 1952 by agreement between CIB and FID (Conseil International du Bâtiment pour la Recherche, l'Étude et la Documentation and Fédération Internationale de Documentation), is a joint committee for the international study of building classification (see *Aslib Proceedings*, vol. 5, no. 1, February 1953, pp. 50–1). At the recent session, Mr A. B. Agard Evans, Ministry of Public Building and Works, was appointed Chairman and Mr David Dean, Royal Institute of British Architects, Secretary. The Committee has a UDC Sub-Committee (Chairman, Mr Agard Evans; Secretary, Mr G. A. Lloyd, British Standards Institution), an SfB Sub-Committee (Chairman, Mr E. Nicklin of Helsinki; Secretary, Mr Dargan Bullivant of London), and a Publications Sub-Committee (Chairman, Mr Dan Fink of Copenhagen); it has also set up an SfB/UDC liaison working group to study the complementary functions of the two systems.

At the meeting the following progress in publications was reported. During the year, new versions of the *Abridged building classification* (ABC)—already available in Dutch, English, French, Hungarian, Norwegian, Serbo-Croat and Swedish—were added, in Danish, German and Italian; and it is hoped soon to publish further versions in Spanish, Portuguese, Russian, Esperanto, Finnish and Japanese. A BSI/UDC Panel has carried out a draft review of UDC 7/72, and a Working Party on Farm Buildings has completed a draft on 631/.2. The RIBA Technical Information Service has published the *SfB/UDC building filing manual*; the Danish Centre for Documentation has republished IBCC Reports numbers 1–4, with a new introduction; and the retiring Secretary, Mr R. Mølgaard-Hansen, has published IBCC Report number 6, *Bibliography on building documentation* 1938–1962.

The *Abridged building classification* can be purchased from British Standards Institution, 2 Park Street, London W1, or from CIB General Secretariat, Bouwcentrum, Weena 700, Rotterdam, Netherlands. The IBCC Reports can be ordered from Bouwcentrum and there are also copies in Aslib library; the *SfB/UDC building filing manual* can be purchased from the RIBA, 66 Portland Place, London W1.

Swedish Institute for Documentation

The Swedish Academy of Engineering has made a proposal to the Swedish Government for the establishment of an institute for documentation at Stockholm University. The institute would run a course for graduates who would be able to work for a doctor's degree in documentation. An outline of the course is given in *Tidskrift för Dokumentation*, årg. 18, no. 3, 1962, pp. 33–7.

Information Theory

A theoretical study of techniques of information storage and retrieval has been initiated at Lehigh University by Mr D. J. Hillman. It has the support of the National Science Foundation, in Washington. The study will analyse the theories underlying information systems, and four particular models for information storage and retrieval have been selected: the boolean algebra model, the relational model, the n-dimensional euclidian geometry model, and the tree-representation model.

Classification Key for Patents

The Patent Office is carrying out an extensive revision of the subject headings of the Classification Key for Patents; the edition of the key operative from Specification no. 920,000 will embody approximately seventy-five of the newly defined headings (replacing approximately 245 of the existing ones) and will be published about the end of this year. The first step in the revision is a drastic reduction of the number of headings, from the present 1,420 to about 410, and the main purpose is to bring the whole scheme into line with the International Patent Classification. Users of the Key should find it much easier to handle for this, and the following, reasons: headings concerned with similar subject-matter will be merged (about 280 of the 410 headings will be combinations of the existing ones) and reclassification of particular fields will be made easier by this placing of like with like.

The remainder of the changes will probably be published in the editions of the Key operative from Specifications 940,001 and 960,001. All changes will be announced in the *Official Journal (Patents)*. Later it is planned to replace the present headings by a more logical scheme, of about forty divisions, each broken down into eight sections, where the divisions and sections will correspond approximately to the classes and sections of the International Patent Classification.

Co-ordinate Indexing

A report on co-ordinate indexing has been produced by Documentation Incorporated, Washington, DC, under contract with the National Science Foundation. It is called *State of the art of co-ordinate indexing* and includes chapters on the literature of co-ordinate indexing, on co-ordinate indexing and classification theory, and on vocabulary generation and control, as well as on practical matters such as mechanization. The report is obtainable from the Office of Technical Services, Department of Commerce, Washington 25, DC (order number AD 274393). Xerox copies cost $16.50 each and microfilm $8 each.

Librarian and Book World

Publication of *The Librarian and Book World*, which has been in circulation since 1910, is to be suspended. In the last, December 1961, issue (which was received in Aslib on 10th September 1962) the Editor was hoping 'to outline proposals for bringing the publication dates of this journal into line with the calendar'; but unfortunately the printers of *The Librarian* are closing down and its future is uncertain. The Editor hopes to make a further announcement in due course.

Technical Report Writing

The next in a series of three-day courses on technical report writing is to be held from Monday to Wednesday 26th to 28th November, in London. These courses are run by OTMA Management & Sales Training Consultants, at their premises at 6 Carlos Place, Grosvenor Square, London W1.

The courses are designed for scientists, engineers, and others who have to write technical and research reports in the fields of industry, management, or scientific research. Each course is limited to twelve people and the fee is 18 guineas. Further information may be obtained from OTMA.

Course on Business Records

In the spring term, 1963, the Department of Economics and Business Studies and the Department of Librarianship of the North-Western Polytechnic will hold a course on 'Business records—their management and Use' in conjunction with the British Records Association. There will be ten lectures, on Wednesday afternoons from 16th January to 20th March.

The course will be given by specialists in the handling of business records, and is designed for business executives and for people responsible for business archives. The fee for the course will be 5 guineas; further information may be had from the North-Western Polytechnic, Prince of Wales Road, London NW5, or from Mr R. C. Jarvis, The British Records Association, The Library, King's Beam House, London EC3.

ASLIB ELECTRONICS GROUP CONFERENCE

Fourth annual conference, Ashridge, 1st–3rd June 1962

THE KEYWORD

Its Use in Abstracting, Indexing and Retrieving Information

J. D. BLACK
IBM British Laboratories

IT is only within the last six or seven years that the keyword has seriously been considered as a useful media for information processing and retrieval. This is in the main due to the efforts of H. P. Luhn of the IBM Advanced Systems Development Division. In this paper I intend to consider three of his techniques in which the keyword is exploited. But first of all let's bring the keyword into focus.

Librarians have been accustomed to using systems, schedules, thesauri, lists of headings, etc., to define and classify the literature which comes into their keeping. They use these same methods to retrieve and disseminate this literature. However, within recent years these methods have begun to show signs of strain, and in some cases breakdown, due to the tremendous increase in the volume and complexity of technical literature. Advances in chemistry, atomic physics, electronics and aeronautics have distorted and blurred the existing systems of classification. The logicality of hierarchical breakdown is often non-existent. The overlapping of technologies into many disciplines imposes a great strain on existing systems.

As subject interests become narrower and our knowledge becomes more specialized we find that we cannot fit new subjects in under existing schedules or headings. The only word or words which will describe a subject are those by which the workers in that field refer to it. This is, of course, what Luhn calls the 'Keyword' or significant word. With the advent of high speed data processing equipment, which is able to handle variable-length words (as opposed to the earlier ones which used a fixed-length word) the keyword becomes suitable for manipulation in a computer. The keyword concept has been used by Peter Luhn in three basic ways. As an indexing term, as a criteria for assessing the significant sentences in a text, i.e. an abstract, and as a method of linking documents to readers.

Let's consider first the KeyWord In Context Index. This is a method of indexing which relies on the significant words in the title of a work. This approach to finding a relevant document is not new. The oldest book in the world has had such an index for many years—the concordance to the Bible. However, the compilation of this concordance was a tremendously tedious task involving years of devoted attention. More recently the Pontifical Faculty of Philosophy in Milan decided that they would make an analytical index and concordance to the Summa Theologica of St. Thomas Aquinas, and approached IBM about the possibility of having the operation performed on Data Processing machinery. A method was evolved and the index and concordance produced within four years by ten scholars. The manual operation would have taken fifty scholars ten years. Experience gained in this project contributed towards the development of the KWIC Index.

The machine procedures for producing this type of index are fairly straightforward. Rules[1] for the punching of cards are available and programs have been written for running on several IBM computers. Fundamentally the procedure is as follows. The basic information on the document is punched in cards. The information is divided into three types (1) author entry (2) title entry and (3) source entry. These three types of entry each have a separate set of cards (Fig. 1). The data is punched into the cards as follows. The first author's surname is started in column 1, followed by a space and then by his initials without spaces between them. Columns 73–75 are used to indicate the number and sequence of cards containing author entries, and similarly for title and source entries. Columns 76–80 contain a reference number for all the cards relating to an individual document. If there is more than one author, the subsequent names may be entered either in specified fields on the first card or else on individual extra cards, all these author entries starting in column 5.

The title is also started in column 1 and is punched in full without any abbreviation or hyphenation. If the title extends beyond the capacity of the card it is continued in a second card, starting in column 2.

The source card, i.e. publisher or journal, page numbers, date, etc., are punched in the third set, also starting in column 1.

Columns 60–72 are left blank. This is to allow for the insertion of Luhn's coded reference. This reference provides a unique code for each document, which is produced by the computer from information on the cards. The code consists of the first four letters of the primary author's name, his first two initials, the last two digits of the year of publication and the initials of the first three significant words in the title.

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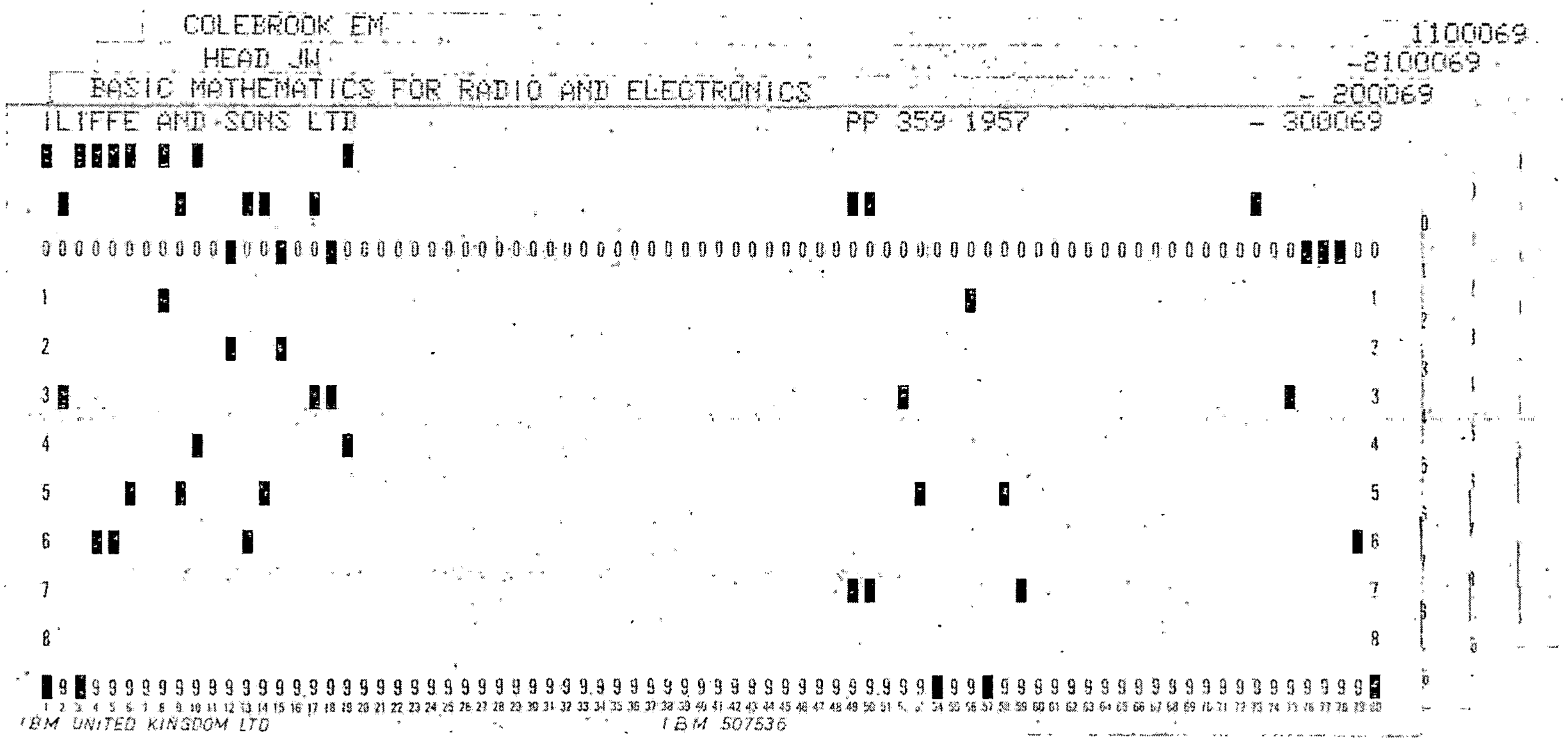
When the cards are punched they are fed into the computer, which will first devise the Luhn code and insert it into the appropriate columns. If the code is not required this step can be omitted. It will then sort the author entries into alphabetical order and produce a magnetic tape for subsequent print-out; it then commences on the title card, and selects the keywords. However, before this can be done the computer must know which are the keywords. You can appreciate that to compile a list of possible keywords is an impossible task. Therefore the machine is given a list of insignificant words, i.e. those that will have no significance within the subject field of the documents. These insignificant words are stored in the machine. The machine will then compare every word in the title



COLEBROOK EM
HEAD JW
BASIC MATHEMATICS FOR RADIO AND ELECTRONICS
ILIFFE AND SONS LTD
PP 359 1957

1100069
-2100069
- 200069
- 300069

IBM UNITED KINGDOM LTD
IBM 507536

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Figure 1

with this list; any words which coincide are considered to be insignificant and indexing is inhibited. Any words not in the list proceed with indexing. A few of these will, of course, have little significance but the cost of eliminating them outweighs the disadvantage of having them in. These keywords are then arranged so that each one starts on an imaginary margin, and the rest of the title is arranged around it (Fig. 2). In effect the keyword is still in context. Every keyword in the title is so treated. When all the titles have been processed the keywords are sorted by the machine into alphabetical order. This last process is fed out on to magnetic tape which together with the author index and the complete author-title-source entry are printed out on to paper (Fig. 3). The document number or the Luhn code is used to link the KWIC entry and the author entry to the bibliographic entry. This paper output may then be copied on to litho plates and reproduced.

These then are the mechanics of the operation. To what extent is the technique being put to practical use? Is it of practical use? What is the attitude of a reader to it? How efficient is it? Is it economically feasible?

It is being put to practical use. As early as summer 1959, a KWIC Index to all IBM formal reports was being used by IBM's R & D libraries. This was revised and brought up to date in April 1961 as a result of the 1960 IBM Librarians' Conference at Owego. This meeting also urged that the index be issued at regular intervals. The index is now being issued every six months. Various parts of the Corporation have used this technique to produce: a *Bibliography on information retrieval*; a *Bibliography of IBM bibliographies*; the *British Laboratories library catalogue*; and an *Index of programs for IBM computers.*

Other organizations have adopted the technique. *Chemical Titles,* a KWIC Index to Chemical Abstracts, started to appear in 1961 but, in contrast to most indexes, this one is available before the abstracts are published. Bell Laboratories in New Jersey are indexing their own reports in this way. Stanford University Press have published an *Index to Dissertations in Physics* in a type of keyword index. The English Electric Company have also been doing work on indexing their reports by a modified KWIC.

We have, therefore, a tool which has been tried and tested. Is it then of practical use? I would say it is. I know that our library and information staff use it regularly and effectively. If it were not of practical use, IBM librarians would not have pressed for it to be used as extensively as they have done. *Chemical Abstracts* have continued to issue *Chemical Titles.* The general feeling is that this is a practical tool, with, like all tools, some limitations.

What is the readers' attitude towards it? Our readers are sold on it and they very quickly understand the way it works. They don't have to check under headings to find numbers and then under numbers to find cards. They can take a handy booklet, sit down at a table and look under the words they know and use, and which they expect other engineers to use in titles. It is as simple as a dictionary catalogue, but a copy can be put on every engineer's desk. We do not have enough chemists from whom to get a cross-section of opinion on *Chemical Titles,* but I believe chemists at the Atomic Energy Research Establishment use it and like it.

Whilst the index may be practical and usable, we still do not know precisely

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                BASIC  MATHEMATICS FOR RADIO AND ELECTRONICS         00069
  BASIC MATHEMATICS FOR  RADIO AND ELECTRONICS                       00069
THEMATICS FOR RADIO AND  ELECTRONICS                                 00069
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Figure 2

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00069   COLEBROOK FM
            HEAD JW
        BASIC MATHEMATICS FOR RADIO AND ELECTRONICS
        ILIFFE AND SONS LTD                              PP  359 1957
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DE TO THE LITERATURE OF MATHEMATICS AND PHYSICS                                  00234
                        MATHEMATICS FOR ELECTRONICS                              00346
           A COURSE OF  MATHEMATICS FOR ENGINEERS AND SCIENTISTS VOL 1           01639
               APPLIED  MATHEMATICS FOR ENGINEERS AND PHYSICISTS                 00023
                HIGHER  MATHEMATICS FOR ENGINEERS AND PHYSICISTS                 00260
                        MATHEMATICS FOR ENGINEERS PART 1                         00347
                        MATHEMATICS FOR ENGINEERS PART 2                         00348
       ➡———————→ BASIC  MATHEMATICS FOR RADIO AND ELECTRONICS                    00069
                        MATHEMATICS FOR TECHNICAL STUDENTS BOOK 3                01136
                        MATHEMATICS FOR TECHNICAL STUDENTS BOOK 1                01578
                        MATHEMATICS FOR TECHNICAL STUDENTS BOOK 3                01587
              ADVANCED  MATHEMATICS FOR TECHNICAL STUDENTS PART I                00010
              ADVANCED  MATHEMATICS FOR TECHNICAL STUDENTS PART II               00011

                          01344   CLASON WE
                          01347   CLASON WE
                          01016   CLEVERDON CW
                          01204   CLOTHIER CR
                          00326   COCKETT AH
                          00267   COCKRELL WD
               ➡———————→ 00069   COLEBROOK FM
                          01121   COLLINS AT
                          00070   COMPUTER CONSULTANTS LTD
                          00507   COMRIE LJ
                          00247   CONDON EU
                          00481   CONDOYANNIS GE
                          01122   CONN GKT
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Figure 3

how efficient it is. In its present form, the efficiency is dependent on the author's choice of title. We have a mathematician who wrote a report comparing decimal and binary notation, which he titled 'Fingers or Fists' (tens or twos). This was, I suspect, a piece of deliberate sabotage; but before long the engineer, scientist, or mathematician will realize that if his title is not descriptive enough his paper will not be used as much as it might be. One way of compensating for an inadequate title is to add significant words to the end of the title, enclosing these in parenthesis. This will ensure entry in the index whilst still retaining the title. This type of index would attain its highest efficiency if it were to use a set of descriptors instead of the title. The machine could then provide a thorough and exhaustively permuted set of entries. Like all indexes and catalogues its efficiency depends a great deal on the intelligence with which it is used. The user must discipline himself so that the search is approached systematically. He must start off with a list of significant words, plus synonyms. Then, as the search progresses, more words are suggested by the titles scanned. As I hinted a short way back, if an author does not include in his title at least one significant word he doesn't deserve to be read!

It has been estimated that the efficiency of KWIC indexing is about 76 per cent compared with about 82 per cent for conventional indexing or classification. One of the advantages of this system is that, unlike conventional cataloguing methods, practically no intellectual effort is employed in the compilation of the index. The cards are punched by girls of typist equivalence. The intellectual effort is used when information is actually required. What percentage of the entries in a conventional abstract index are ever referred to? I would estimate that between 25 and 50 per cent of abstracts are never referred to, i.e. up to 50 per cent wastage! Even so, you may say, to do it by computer would cost many times more than the wastage, if you have a computer! Let's take it that you don't have a computer. You can easily hire one. At what cost? Let's say you have 2,000 abstracts to be classified or indexed. The following table compares KWIC indexing with conventional indexing, showing approximately their relative cost and efficiency.

	Conventional indexing (e.g. UDC)	*KWIC indexing on an in-house computer*	*KWIC indexing on a data centre computer*
Cost for 2,000 documents	£500	£200	£350
Efficiency	82%	76%	76%

Another tremendous advantage of this computer retrieval technique is that the output may be used at any time. Most present computer retrieval techniques require time on the machine before a single item may be produced. As libraries usually have a low priority on computer time, long delays often occur between request and receipt of information.

Once the index has been produced it may be easily updated with new additions. It would also be possible to produce bibliographies by specifying to the computer the significant words for the subject field and have it produce an index of titles in which those words occurred.

These then are some thoughts on an indexing technique which is well within the reach of most libraries. It is not the perfect answer to our problems. There is no such answer. It is, though, a practical tool which we can make and use, and which reduces intellectual input effort, thus freeing that effort to be spent more profitably in getting information to our users.

Another Luhn technique which has become well known is Auto-abstracting. As this has been written up in the *IBM Journal of* R *&* D[2], I will not discuss this technique in this paper.

The third application of keywords is to the 'Selective Dissemination of Information' (SDI). This again is one of Peter Luhn's techniques. The SDI system enables an engineer to specify the subjects in which he is interested by means of what we have called keywords. Incoming documents are assigned similar keywords. The readers' keywords are compared with the documents' keywords and where there is a match a card is produced and sent to the reader informing him of the document. This, then, is the basic system. The details are as follows.

When an engineer asks to be serviced by the system he is sent a form to be completed. This asks for his name, department number and address. In addition he is asked to name the subjects on which he wishes to be notified. At present he uses the terms he thinks of and also their synonyms. It might be more efficient to ask him to select from a thesaurus compiled from those words used for documents over several years' working. The reader then returns his form to the centre who punch up cards for this information. They are transcribed on to magnetic tapes which contain the same kind of entry for all members of the system. As documents come into the system, cards are punched containing the document number, also the words describing the subject. These may be either keywords or descriptors assigned by the SDI staff. In addition, an abstract is conventionally printed on a punched card together with the bibliographic details of the document. This abstract card is used by the reader to assess the relevance of the document and may also be used to compile his personal card index. When the document cards have been punched these are also transcribed on to tape. The reader tape and the document tape are then compared to match the readers' keywords with those of the document. However, the comparison is between the many words in the readers' list with the few in the documents' list. Therefore there has to be some criteria to determine how many of the documents' words should be found in the readers' list before a 'hit' is recorded. An equation has been worked out to determine the percentage of coincidence to warrant a 'hit'. The computer will apply this equation to each comparison automatically.

When a 'hit' has been recorded a punched card is produced which contains the reader's name and address and also the document number. The punched card is then clipped to the abstract card which also bears the document number. However, the punched card is more than an address card. It has provision for the reader either to request or decline further information and to state his reasons for not requiring it. Any of the reasons are analysed to provide feedback on the efficiency of the system. If the reader requires a copy of the document he punches the port-a-punch type card in the appropriate row and returns it to the SDI centre. The appropriate 'hard copy' is sent back to him together with another similar type of card on which he can indicate the document's relevance to his needs. This also is used as feedback on system efficiency.

This then is SDI in brief outline. The questions one may ask are similar to those on KWIC, and the answers are basically similar. The technique is being widely used within IBM's R & D laboratories. We in the British Laboratories are members in the ASDD scheme and are finding it very useful. It is turning up a considerable amount of relevant information and the engineers who use it, like it. Its efficiency is difficult to assess. One never knows how many documents one has missed when doing a search. We do not receive a large amount of 'trash', i.e. references of no relevance, so that we may consider it to have a fairly high efficiency. The system does in fact insert irrelevant 'hits' from time to time to test whether or not the reader is wide awake enough to notice the difference. The economic feasibility of SDI is not so easy to assess as KWIC. However, if an organization feels it is essential to undertake the dissemination of information on a large scale this system would perform the function more quickly and at a lower cost than a manual system, and would probably be as efficient as the average information officer. The main advantage is that it can match a large number of documents to a large number of readers in a very short time, a task which is physically impossible even for a high-quality information officer.

Again this technique has been performed on a variety of IBM computers, and if you don't have one you can buy time on one. Unfortunately one cannot estimate the cost of this operation with any accuracy, as the input varies according to the number of readers in the system, the number of words in the readers profile, the number of documents put into the system, and the number of words describing each document. The cost on a Service Bureau machine could only be assessed by a detailed discussion of each individual case. However, a growing number of American organizations with problems of dissemination of information are finding this technique a paying proposition.

These then are three techniques using the keyword concept. Two, indexing and dissemination, are in regular use and the other is waiting for a suitable automatic page-reading device. When this device becomes available not only will auto-abstracting become a feasible proposition, but, even more important, a complete library information processing system will be feasible. For example, new periodicals, reports, conference proceedings, etc., could be presented to the reading machine which would input to the computer the title, author, source, date, pages and text. The computer could then:

(1) produce auto-abstracts of the papers;

(2) using either the titles or the keywords on which the abstracts were based, produce a KWIC index to the literature;

(3) compare the abstract keywords with the users' profile and print out abstract cards addressed to the appropriate readers;
(4) produce an abstract bulletin complete with its own KWIC index and author index; and
(5) produce bibliographies on selected subjects.

The above five are the minimum benefits. It would be quite feasible to do detailed searches of the complete texts by machine, thus providing the ultimate in information retrieval.

These techniques are now within the reach of the majority of library and information services. The next decade will, I am sure, see a revolution in these services which will change completely the present structures of library organizations. There will inevitably be a definite cleavage between intellectual and clerical operations. The latter will be done to a great extent by data processing equipment, leaving more time and effort available for those operations which cannot be undertaken by machines.

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EXPERIENCE WITH COMPUTER-PRODUCED INDEXES

N. G. DOWELL
Chief Programmer, KDP 10, Data Processing & Control Systems Division, English Electric Co. Ltd, Kidsgrove

and

J. W. MARSHALL
Chief Librarian, Group Central Library, English Electric Co. Ltd, Whetstone

Electronics Group Conference, Ashridge, 1st–3rd June 1962

THE object of this paper is to describe English Electric work and experience in the development and application of computer-produced indexes.

For some time we have been studying ways and means of improving our productivity so as to keep pace with the rapidly growing flood of publications under the handicap of a relatively stable library budget. Like many others, we have closely followed the progress of machine design for business systems and automatic data processing and we have been impressed by the fact that such machines are very good at performing simple clerical operations such as sorting, matching, and collating, the very operations which occur in so many library procedures. We first became interested in the possibilities of computer-produced indexes through Luhn's work at IBM and the early examples of KWIC indexes which were distributed at the time of the Washington Conference (International Conference on Scientific Information, November 1958).

The material we had in mind for computer-produced indexes were our current-awareness bulletins and lengthy bibliographies. Initially we decided to use a computer for the indexes to our *Reports Abstract Bulletin.* We maintain in our Group Central Library a central file of company technical reports and we produce a monthly bulletin to advertise newly received reports by giving abstracts of them. The Bulletin is equipped with author and report number indexes, and also a comprehensive subject index normally compiled on chain-index lines as exemplified by the *British National Bibliography.* The Bulletin is distributed widely throughout English Electric and its associated companies in this country and abroad. It goes to many factories where library and information services are virtually non-existent and it is therefore required to fulfil the dual role of a current-awareness bulletin and a tool for retrospective searching. To facilitate the latter role we have compiled and distributed cumulated annual indexes.

Initially we started to gather experience by using a permuted-title index of the KWIC type which was programmed for a DEUCE computer. Features of this index were similar to those described in the companion paper by J.D. Black (p. 313 of this issue of *Aslib Proceedings*). However, we had serious doubts about the usefulness of the permuted-title index for a number of reasons. Some of these are perhaps peculiar to our particular circumstances; nevertheless they should be detailed because the circumstances may not be unique.

DISADVANTAGES OF PERMUTED-TITLE INDEXES

In the first place, we doubt the basic premise of permuted-title indexing that titles of reports or journal articles are satisfactory as a basis for actual subject index entries. Frequently titles either lack sufficient detail or are in fact misleading. For example, consider the seemingly explicit title of a recent internal report: 'Radiation effects on sealing materials for disposable bottles at Hinkley Point'. Nowhere does this title reveal that the report concerns equipment for removing and storing used fuel elements from a nuclear reactor. Yet all this information is essential for adequate indexing. Report titles of the following variety are all too common: 'Visit to XYZ Ltd, to discuss resin compounds.' This in no way indicates that the report compares phenolic resins of a particular grade with epoxies currently in use for encapsulating the windings of d.c. motors. Yet it is full of irrelevant information as far as subject indexing goes.

It would not be difficult to find many more examples of totally inadequate titles. One could start with any issue of any American trade magazine. In the case of internal reports, the claim has been made that it is possible to educate authors to write descriptive titles, particularly in the closed-circuit environment of an organization. In our view this is the old story of the tail wagging the dog and we see no possibility of it happening in a large company like our own which enjoys highly decentralized administration.

A second disadvantage of the permuted-title index results from an almost total absence of terminology control. This straightaway negates one of the fundamental purposes of indexing, which is to promote unity of concept by using a standardized vocabulary. Even the best alphabetical indexing is liable to suffer from lack of consistency in the choice of entry word, and what are essentially the same subjects are frequently dissociated by the use of synonyms. This problem of 'conceptual scatter' becomes a nightmare when highly idiosyncratic author language is used as a basis for subject indexing. Furthermore, in spite of an ever-growing list of insignificant terms for suppression by the computer the number of redundant entries in a permuted-title index is very considerable.

Thirdly, the permuted-title index, compared with orthodox indexes, is far too heavily dependent on specific entry. It is common knowledge that most people frame their requests for information in the most general way possible, and although the inclusion of generic concepts in an index is essential for providing guidance to the user when he makes a normal approach, this is not possible in the basic permuted-title index.

In our own organization there is one further disadvantage of the basic permuted-title index. Most of the documents advertised in our current-awareness bulletins do in fact receive a thorough subject analysis for classification by our *Faceted subject classification for engineering*[1] before they are entered in the library catalogue. It seems to us that there is no justification for duplicating the indexing of documents and that therefore our detailed subject analysis should be kept as an essential part of the indexing process.

As will be appreciated from this brief consideration of some of its disadvantages, the basic permuted-title index implies an acceptance of low indexing standards. We would question most seriously whether lower indexing standards are in fact desirable for current-awareness bulletins. Certainly when a bulletin has to be both a medium for dissemination and also an aid to retrieval, as is the case with our *Reports Abstract Bulletin,* only the highest standards of indexing are permissible. Of course it can be argued that the basic permuted-title index can be substantially improved by editing and rewriting the titles before they are submitted to the computer—and we would not dispute this; indeed it is already being done as a matter of routine for the *KWIC index to neurochemistry.*[2] But this of course destroys the great advantage claimed for the permuted-title index, 'that it is a purely clerical process'. Intellectual effort has entered the picture again and we are back where we started.

This is a useful point to begin our account of English Electric work because we decided to design a computer-produced index which should make full use of our detailed subject analysis of documents, the emphasis of the computer programme being placed on taking over and speeding up the tedious routine elements of indexing. Our programme is called the KDP 10 Permuted Chain Index.

PERMUTED CHAIN INDEX

Let us explain what is meant by a permuted chain index. We mentioned earlier that our previous practice was to analyze the subject content of documents with the aid of a facet classification, and to produce a chain of standard terms or phrases derived from the classification schedules. Following normal chain-index procedure we then generate a set of more general entries by omitting each left-hand phrase in turn. The order of phrases is given by the rules for combining facets in the classification.

Experience with our library catalogue has shown that to index terms in one direction only is not altogether satisfactory for retrieval. The weakness of the arrangement becomes evident when the inquirer poses his question in an order of terms not covered by the index.[3]

However, a solution to the problem is possible if each term or phrase is used as the entry word (keyword) in the index. By this means the one-way approach in the index is avoided and all related entries can be found immediately. At the same time it is useful for the complete chain to be retained for each entry; that is to say if the complete chain is given after each term or phrase when it is used as the keyword. This procedure enables each entry to demonstrate relationships between facets in the chain, thus showing the context of the keyword. As an example, the following entries are those required for the internal report cited earlier:

ATOMIC REACTORS see NUCLEAR REACTORS

BOTTLES:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
BUTYL B70:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123

CONTAINERS see also BOTTLES

FUEL ELEMENTS:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
GAMMA RADIATION:	EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
HINKLEY POINT:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123

NEOPRENE:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
NUCLEAR REACTORS:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
RUBBER:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
SEALS:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
SPENT FUEL ELEMENTS:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123
SYNTHETIC RUBBER:	GAMMA RADIATION: EFFECT ON SYNTHETIC RUBBER: SEALS: BOTTLES: SPENT FUEL ELEMENTS: NUCLEAR REACTORS	123

Permuting the facets of a chain in this fashion is an elementary clerical operation well within the capability of a computer and the method forms the basis for our computer-produced index. It is interesting to compare the above example with the corresponding instructions to the computer which are illustrated in Figure 2 on page 329.

KDP 10 PERMUTED CHAIN INDEX

In order to make the most effective use of the method we decided to have the permuted chain index programmed for a large data-processing computer, the English Electric KDP 10. For a year now this computer has been engaged in commercial data-processing work as part of the English Electric Central Computing Service at Kidsgrove, Stoke-on-Trent. It is specifically designed for business applications, having high reliability, rapid input-output and comprehensive facilities for processing variable length items of data such as arise in the permuted chain index.

As can be seen from Figure 1, the printed version of the KDP 10 permuted chain index is more conventional in appearance than the KWIC index. Permutation is not achieved by moving lines bodily along or by sorting a word in the centre of a column. In effect the computer accepts a logical chain of terms or phrases and proceeds to permute these so as to produce further entries, using each phrase in turn as the keyword. An entry consists of the keyword, followed by the chain which contains it, and the appropriate item number of the original document or abstract.

All the chains read into the computer are permuted in this way and the resulting entries are written out in turn to a magnetic tape file. The next step is to sort the file of entries into alphabetical order. The sorting routine uses a standard programme which is very powerful in that it is capable of sorting a variable number of records, each of variable length, to the order of a specified key which is contained within each record and may itself vary in length. The computer is thus capable of true letter-by-letter sorting and in our case this ability is retained for the first 150 characters of the entry. It is interesting to note that the abstract number is also included in the key for the entries so that otherwise identical entries will appear in order of item number, a necessary condition for successful editing.

However, an alphabetically sorted file of permuted chains still does not

ALPHABETICAL SUBJECT INDEX

```
POWER SYSTEMS: RECIPROCATING COMPRESSORS: EFFECT ON VOLTAGE FLUCTUATIONS: POWER
                    SYSTEMS                                                                295
PRECIPITATION CHARACTERISTICS: MICROSTRUCTURES: CHROMIUM MOLYBDENUM VANADIUM LOW ALLOY
                    STEEL:   CASTINGS: STEAM TURBINES                                      397
PRESSURE DROP: AIRFLOW: SPLITTERS: CANS: FUEL ELEMENTS: CO. 2 GRAPHITE REACTOPS            319
PRESSURE VESSELS: STRESS ANALYSIS: PERFORATED PLATES: CONCRETE PRESSURE VESSELS:
                    NUCLEAP REACTORS                                                       407
PRESSURIZING:  MANUFACTURE: MAGNESIUM ALLOY: CANS: FUEL ELEMENTS: CO.2 GRAPHITE
                    REACTORS                                                               315
PROGRAMMES:.
               ALGOL: PROGRAMMES: KDF 9 COMPUTERS                                          422
               DEUCE COMPUTERS                                                             419
               DEUCE COMPUTERS: CALCULATIONS: BENDING STRESSES: BEAMS                      403
               DEUCE COMPUTERS: CALCULATIONS: STEAM CYCLES: NUCLEAR REACTORS               306
               DEUCE COMPUTERS: CHARACTERISTICS: AXIAL COMPRESSORS                         327
               DEUCE COMPUTERS: COLLISION PROBABILITIES: LATTICE CALCULATIONS: NUCLEAR
                    PEACTORS                                                               321
               DEUCE COMPUTERS: ELLIPTIC DIFFERENTIAL EQUATIONS: ELASTICITY                404
PROTECTIVE GEAR, ELECTRICAL:
               OVERCURRENT PROTECTION: SEMICONDUCTOR RECTIFIERS                            331
               RELAYS: PPOTECTIVE GEAR, ELECTRICAL: SEMICONDUCTOR RECTIFIERS: TPACTION     330
PUNCHED CARD READERS: KDP 10 COMPUTERS                                                     431


QUALITY CONTROL: BILLET INSPECTION LINES: QUALITY CONTROL: CONTROL SYSTEMS                 413, 416


RADAR:         MOVEMENT DETECTION SYSTEM: RADAR                                            299
RADIATION EFFECTS: HIGH TEMPERATURE CORROSIOM: BEPYLLIUM                                   311
RADIATOR FANS: SPEED CONTROL: ELECTROMAGNETIC SLIP COUPLINGS: RADIATOR FANS: COOLING
                    SYSTEMS:   TRACTION DIESEL ENGINES                                     303
RADIO TRANSMISSION LINKS: TRANSISTORS: RADIO TRANSMISSION LINKS: TELEMETRY                 298
RADIOACTIVE MATERIALS: DECONTAMINATION: SAFETY: RADIOACTIVE MATERIALS                      322
REACTORS:
                                                                                           356
                  SEE ALSO: NUCLEAR REACTORS
RECIPROCATING COMPRESSORS: EFFECT ON VOLTAGE FLUCTUATIONS: POWER SYSTEMS                   295
RECTIFIERS:
               CALCULATIONS: ROTOR LOSS RECOVERY SCHEMES: SLIP RING INDUCTION MOTORS       329
               COPPER: ALUMINIUM: SOLDERED JOINTS: ELECTRICAL CONNECTIONS                  372
               OVERCURRENT PROTECTION: SEMICONDUCTOR RECTIFIERS                            331
REINFORCED HOLES:
               STPESS ANALYSIS: PERFORATED PLATES: CONCRETE PRESSURE VESSELS: NUCLEAR
                    REACTORS                                                               407
               STRESS CONCENTRATION FACTORS: REINFORCED HOLES: PLATES                      408
REINFORCED PLATES: PUCKLING: REINFORCED PLATES                                             402
RELAYS:        PROTECTIVE GEAR, ELECTRICAL: SEMICONDUCTOR RECTIFIERS: TRACTION             330
RESEARCH:      BEARINGS: DIESEL ENGINES                                                    377
RESIDUAL FUEL DIESEL ENGINES: FUEL ASH CORROSION: VALVES: RESIDUAL FUEL DIESEL ENGINES     386
RESIDUAL FUEL OILS: FULL ASH CORROSION: INHIBITORS: RESIDUAL FUEL OILS                     387
RESINS,           SEE: EPOXY RESINS: SILICONE RESINS
RESISTANCE WELDING: TITANIUM ALLOYS: SANDWICH PANELS: AIRCRAFT                             412
RESISTOPS:     AIP BLAST CIPCUIT BREAKERS                                                  348
RING COPES:    ELECTRICAL STEEL: RING CORES: TRANSFORMERS                                  399
ROLLER BEAFINGS: STRESSES AND LOADS: ROLLER BEARINGS: TRACTION D. C. MOTORS                375
ROLLING MILLS: CONTROL SYSTEMS: SHEET CLASSIFIER EQUIPMENT: SHEARING LINES: ROLLING
                    MILLS                                                                  418
ROTARY VALVES: BENDING STPESSES: STRESSES AND LOADS: ROTARY VALVES: WATER TURBINES         405
ROTOR LOSS FECOVEPY SCHEMES: RECTIFIERS: CALCULATIONS: ROTOR LOSS RECOVERY -SCHEMES:
                    SLIP PING INDUCTION MOTORS                                             329
ROTOR WINDINGS: AIPFLOW: COOLING SYSTEMS: ROTOR WINDINGS: HYDROGEN COOLED
                    TURBOALTERNATORS                                                       288
ROTORS:
               PHOSPHATE COATING: CHROMIUM-MOLYBDENUM LOW ALLOY STEEL: JOURNAL
                    BEARINGS:   ROTORS: ALTERNATORS                                        291
               VIBRATIONS: ROTORS                                                          378
RUNNERS:       TOPQUE: GUIDE VANES: RUNNERS: WATER TURBINES                                301


SAFETY:        DECONTAMINATION: SAFETY: RADIOACTIVE MATERIALS                              322
SANDWICH PANLLS: RESISTANCE WELDING: TITANIUM ALLOYS: SANDWICH PANELS: AIRCRAFT            412
```

FIGURE I.

KDP 10 PERMUTED CHAIN INDEX

constitute an index. We now want to describe features of the computer programme which are used to transform the raw data into an acceptable index. The programme consists of two sub-programmes: the indexing sub-programme which generates and sorts the entries in the way that has just been described, and the editing sub-programme.

INDEXING SUB-PROGRAMME

Special features of the indexing sub-programme are:

Suppression of certain chain elements as keywords. This feature permits any phrase in the chain to be marked so that the computer will retain it in the chain but will not use it as a keyword. By this means phrases such as 'Effect of . . .', or 'Effect on . . .' which are meaningful in the context of the chain, but which would not be sought terms in the index, can be included in the chain. To make use of this feature the phrase to be suppressed is marked with an asterisk on the data preparation sheet illustrated in Figure 2.

Inclusion of additional keywords. With this feature extra terms can be added to appear in the index as keywords but not to appear in the chain. This is very useful for special synonyms such as trade names. Use of the feature is indicated on the data preparation sheet by introducing a blank phrase into the chain so that all phrases following the blank are treated as keywords only.

Provision for cross-references. Both *See* and *See also* cross-references can be incorporated in the index. This is achieved by generating from the data preparation sheet a single unpermuted entry, consisting of the keyword and the leading phrase (which is *See* or *See also*) followed by a chain of phrases to which cross-reference is made. This entry is treated by the computer as a normal entry except that there is no item number to worry about and the punctuation is slightly different. A typical cross-reference can be seen in Figure 1.

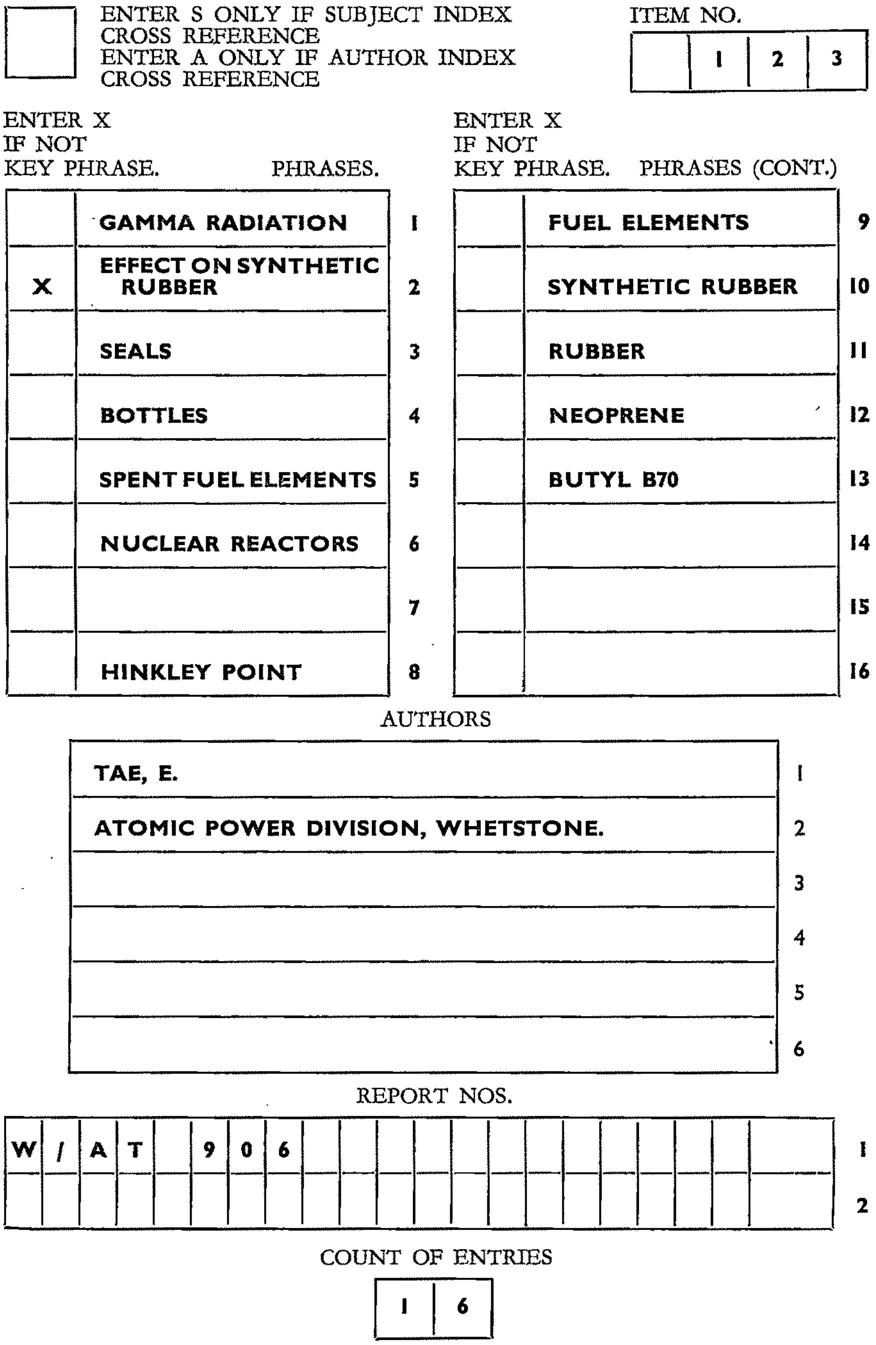
Checking data input. A useful device for checking the accuracy of the computer input is provided by a count of items on the data preparation sheet. To use this feature the indexer counts the number of phrases in the chain (including 'asterisk phrases' and 'keyword-only phrases') plus the number of authors and report symbols. This count is entered on the data preparation sheet and is checked by the computer against the data punched on the input paper tape. Any item showing an inconsistency is printed out on an error list and is omitted from the permuting process. These items are subsequently re-prepared and attached to the front of the paper tape reel, there being no need to remove the erroneous records since their rejection can be ignored when the data is re-run.

Errors detected by this check are of the type where deletions on the data preparation sheet have been interpreted as blank phrases or where phrases have simply been overlooked.

EDITING SUB-PROGRAMME

The most cunning part of the whole programme is the editing sub-programme, the basic objective of which is simply to improve the readability of the index. This it does by carrying out a number of editing functions which include:

Spacing and punctuating the entries. The phrases of an entry are spaced out and punctuated before print-out. This involves locating each phrase in turn and



☐ ENTER S ONLY IF SUBJECT INDEX CROSS REFERENCE
ENTER A ONLY IF AUTHOR INDEX CROSS REFERENCE

ITEM NO.

	1	2	3

ENTER X IF NOT KEY PHRASE.	PHRASES.	
	GAMMA RADIATION	1
X	EFFECT ON SYNTHETIC RUBBER	2
	SEALS	3
	BOTTLES	4
	SPENT FUEL ELEMENTS	5
	NUCLEAR REACTORS	6
		7
	HINKLEY POINT	8

ENTER X IF NOT KEY PHRASE.	PHRASES (CONT.)	
	FUEL ELEMENTS	9
	SYNTHETIC RUBBER	10
	RUBBER	11
	NEOPRENE	12
	BUTYL B70	13
		14
		15
		16

AUTHORS

TAE, E.	1
ATOMIC POWER DIVISION, WHETSTONE.	2
	3
	4
	5
	6

REPORT NOS.

W	/	A	T		9	0	6														1
																					2

COUNT OF ENTRIES

1	6

FIGURE 2. *Data preparation sheet*

moving it bodily to new places within the computer memory. The length of the entry is then considered and, if necessary, break-off points are established so that a word is never split between a line and its continuation. This involves locating the first space to the left of the absolute limit. Continuation lines are then arranged so that they are inset to a standard position six spaces to the right of the standard position of the leading phrase in the chain. The programme will cope with up to six continuation lines for one entry.

Consolidating entries with a common keyword. When several entries begin with the same keyword this is deleted from each entry and is entered on a line preceding the group. All the containing chains are then aligned so that their leading phrases start at a common point and sort alphabetically beneath the keyword. Thus:

```
STEAM TURBINES: BLADES: EROSION: STEAM TURBINES
STEAM TURBINES: DISCS: VIBRATIONS: TURBINES
STEAM TURBINES: PUMPS: LUBRICATING SYSTEMS: BEARINGS
STEAM TURBINES: ROTORS: CRITICAL SPEEDS: STEAM TURBINES
```

is edited to become

```
STEAM TURBINES:
                BLADES: EROSION: STEAM TURBINES
                DISCS: VIBRATIONS: TURBINES
                PUMPS: LUBRICATING SYSTEMS: BEARINGS
                ROTORS: CRITICAL SPEEDS: STEAM TURBINES
```

Compounding identical entries and consolidating item numbers. All entries which are identical except for their item numbers are compounded so as to appear only once in the index. The item numbers are then consolidated by a clever little routine which groups successive numbers, substitutes the least and greatest, and interpolates a hyphen. Thus:

```
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   108
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   109
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   110
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   235
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   401
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   402
```

is edited to become

```
FUSES: SHORT CIRCUIT TESTS: CARTRIDGE FUSES   108–110, 235, 401–402.
```

In addition this routine takes account of the limited column space available, arranges that the item numbers or ranges are never split between lines, and also ensures that they are correctly punctuated. The logical complications which ensue when this feature is exercised simultaneously with consolidating entries having a common keyword and with making-up the page are left to the reader's imagination.

Spacing alphabetical groups. To simplify locating alphabetical groups within the index a double-line space is automatically introduced whenever there is a change of initial letter between consecutive keywords. The effect of this can be seen in Figure 1.

Making-up the page. Finally, the editing sub-programme goes to great lengths in organizing page changes within the index. For example, a group of entries with a common keyword may by chance overlap from one page to another. In this situation the programme arranges for the keyword to be repeated at the top of the next page, supplemented by the phrase 'CONTD' in parentheses, and the group of entries is in fact continued.

However, the programme is even more meticulous than this. It does its best to prevent an entry involving continuation lines from being split between pages. This means that as a page is built up the programme must carefully count the number of edited lines created and maintain a reservoir of edited lines whose writing out to magnetic tape is delayed pending a decision on page-changing.

A useful by-product of delegating page make-up to the computer is that as soon as page numbers are added, the computer's high-speed print-out is directly suitable for reproduction via the xerox/offset-litho process.

OTHER PROGRAMME FEATURES

As well as its indexing and editing sub-programmes the full programme has auxiliary sorting routines for producing author and report number indexes. Editing of the author index follows much the same principles as for the subject index, but the layout varies. For the report number index, editing is very simple, there being no compounding, consolidation or continuation to consider.

Finally, we are able to produce edited cumulative indexes whenever they are required. This is done by a bulk re-sort of the original paper tapes for each monthly index. There is a difficulty, however, because the cross-references can quickly get out of hand since they cannot be so easily compounded as normal entries. It has been judged prudent to arrange for all cross-references to be suppressed from the input tapes during a cumulative run and replaced by a completely new set. This resort to human control is aesthetically distasteful, but economically practical, especially since the cross-reference data preparation sheets can be used from issue to issue without undue difficulty.

CONCLUSION

Our experience of working with the computer is as yet rather limited. We have to date produced indexes to several issues of our *Reports Abstract Bulletin,* and we are still gaining experience. But already a considerable saving in staff time has resulted and the increase in productivity we sought has become a reality.

The emphasis throughout our work has been to delegate almost every routine operation of indexing to the computer and we hope that by describing the various features of our programme in detail we have been able to demonstrate that this can be accomplished successfully, thus leaving the indexer to concentrate on what he and he alone can do—the subject analysis of documents and the assigning of suitable descriptors.

Acknowledgments

The authors thank the English Electric Company Ltd for permission to publish this paper; members of the Data Processing & Control Systems Division (KDP 10 Programming and Operation Staff) for their contribution; and various colleagues, including Mrs J. Aitchison and Mr D. E. Bagley, for helpful discussions and other assistance.

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A SUGGESTED FIRST STEP TOWARDS AUTOMATION

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Ministry of Aviation, Technical Information and Library Services (TIL)

Electronics Group Conference, Ashridge, 1st–3rd June 1962

THIS paper is probably a little out of place in a general session on Information Retrieval since it deals mainly with the possibility of preparing in advance either for the installation of a computer, or for the provision of time on a computer. I think that nowadays even the smallest library (in a largish parent organization) must recognize the eventual likelihood of being allowed a certain amount of computer time. But even if you consider this to be only the remotest possibility, it is still worth considering since it can give you a new slant on your own organization and methods. Basically, the scheme proposed does nothing more than provide a machine readable record for every library accession, and the subsequent use of this, even without a computer, can confer an element of increased efficiency and greater accuracy, with less routine work. The method of providing such a record, which has been chosen for trial in my own branch of the Ministry of Aviation, is by means of an automatic tape typewriter. The process, as I shall describe it to you, has been tailored to fit the existing manual systems as closely as possible but, as many of you will recognize, it owes a great deal to the original tape typewriter plan proposed by Calvin Mooers.[1]

Before going any further, I must give you some of the background which prompted this proposed experiment, starting with some statistics concerning the Ministry's Technical Information and Library Services (TIL):

Annual intake of documents		20,000
Annual output of documents (number of copies distributed)		160,000
Annual intake of requests		60,000
Annual number of index cards filed		140,000
Total number of reports held		310,000
Total number of index cards filed	830,000	1,050,000
and movement cards	220,000	

In round figures, the number of documents is well over the quarter of a million, and the number of cards is over the million. At this stage it would seem appropriate to quote from Senator H. H. Humphrey, Chairman of a US Senate Government Operations Sub-Committee, who said in June 1961 that 'management of scientific information in the United States is being handled on a "Model T" basis, and such obsolete methods contribute to duplication and tragic and intolerable waste of men, money and material'.

It is only when a library (or any collection of data) has a past of this order of magnitude that the question of automation necessarily has to be considered. In general, at such a stage, decisions should not be influenced in any way by the difficulties inherent in any change-over or interim period, but certain hard facts as to cost need to be understood. The first is that in any scheme to change over to computer operation, the cost of converting existing data into machine readable form approaches the cost of the computer itself; and secondly, the cost of the change-over period is approximately the same as a year's normal operating costs. If, however, the machine record can be provided four to five years in advance of the computer, the main cost of conversion is removed (apart from the comparatively small nominal cost of the equipment necessary) and the difficulties of retrospective change-over minimized. If at the same time some marginal gains in efficiency can be achieved, this course begins to show attractive possibilities.

The first logical step therefore was to examine the existing methods available for the production of a record in a machine readable form. These fall broadly into the following classes:

Character reading machines (the ultimate in these machines, of course, would not need the production of a special record)
Film, using optical or magnetic recording
Magnetic tape, card or disc
Punched cards
Punched paper tape

and these are considered separately.

Character reading machines would appear to be most attractive possibilities, and some are claimed to be able to scan 'ordinary business documents and instantaneously translate the information on to punched paper tape at the rate of 240 characters per second'. Some are expected to achieve a rate of 340 characters per second by using magnetic tape as the receiving medium. In spite of these claims it is not expected that these machines will be able to read all styles of type fount for some time to come.

Film shows great promise in the form perhaps of the Magnacard or Magnavue system. The Magnavue system uses cards 1 in. by 3 in. in size; a third of the space is taken up by a photograph of the document, while the remaining two-thirds contains the retrieval coding in magnetic character form. Other systems include the Rapid Film Selector and Minicard. The latter are 16 × 32 mm. cards of high resolution film, holding up to about twelve pages plus 294 bits, or forty-nine alpha-numeric characters of indexing code. This sort of system invariably suffers from the handicap of a very slow input speed, the camera used being the limiting factor. Apart from this, with these systems it is unfortunately all or nothing; they are integrated computer systems which can only confer advantages when used as a whole, whereas our requirement was to produce, as simply as possible, solely the machine readable record and still derive some immediate advantage.

Magnetic tape, disc or card records were considered next, since this form of record appears to be a sort of half-way house. It must be remembered that, theoretically, optical recording methods have a very great advantage over other methods in that a large amount of information can generally be recorded at one go, at least one or two pages; and that furthermore, no checking of the new record is required, assuming of course that at least the focus is correct! With magnetic records, each character has to be fed in individually, and to make matters worse there is nothing to be seen as a result. However, from the point of view of speed, especially reading speed, they come between the optical records (photographic) and the optical records (visual and tactile), such as punched cards and punched tape. A magnetic advantage is the density of packing of information which may be achieved, and it is worth while summarizing in the form of a table:

		Punched cards	*Punched tape*	*Magnetic tape*
Characters per sq. in.		3.8	10	400+
Speed (approx.) in characters per second	Reading	270–1,300	400–1,000	15,000–70,000+
	Writing	135	60–240	15,000–70,000+
Record length		Very limited	No limitation	No limitation

Magnetic cards have an interesting potential, especially as used, for example, in the NCR 315 computer (more familiarly known as CRAM, or Card Random Access Memory), since they are of a convenient size and capacity. They are made of Mylar plastic, are 3¼ in. wide by 14 in. long, and can store magnetically 21,700 alpha-numeric characters, representing a packing density of 475 characters per sq. in. The use of magnetic disc is exemplified by the IBM RAMAC, and again there is a random access facility. Video tape recording comes into the category of magnetic recording, although it is basically a fluctuating wave form which is recorded rather than the binary digital unit. In this case the information to be recorded is scanned by a type of television line scanner, and the electrical output stored on the tape; the tape can then be used to reproduce the stored signal by normal television methods. It should be noted that this type of image is well suited to the xerographic process of reproduction in paper copy form, since it is a line image, thus eliminating the xerographic half-tone reproduction difficulties. Once again, as with the optical systems, these are all rather sophisticated (and therefore expensive) integrated machines which are required, and we are again forced to lower our sights and start coming down to the rather more prosaic punched cards and punched tape methods.

It is possible to acquire a relatively inexpensive punched card facility, not necessarily with sorting or other refinements. For example, punched cards may be produced by linking an electric typewriter to a card punch, and it is then possible to reproduce the material originally typed by feeding the card back into the machine. If the size of your 'unit record' is small, then this sort of system should be seriously considered. In our case, however, we were handicapped by the amount of information each one of our index records contained. The TIL index card includes an abstract of the report, and on the average one card contains 110 words, or approximately 660 characters. Now the basic maximum number of alpha-numeric characters which may be stored per card is eighty, in the almost universal IBM or Hollerith eighty-column card. On this basis, one of our index cards would require approximately nine punched cards to represent it! When more than one punched card per record is required, then capacity is lost because of the necessity of repeating the identifying number (or accession number) on each card. There are methods of recognizing sets of cards, for example by cutting a second corner of the first card of each set, but for safety the accession number needs to be repeated. Of course, if we did without the abstract, the number of cards would be reduced to about three, but this would virtually mean reducing our efficiency in part.

The low information-carrying capacity could be partly solved by using inverted coding.[2] In effect, this would mean using the computer (when eventually available) for a form of peek-a-boo operation; the use of an expensive computer in this manner is hardly justifiable, since existing manual methods of peek-a-boo could probably be just as effective.

Another method of increasing the packing density is by the use of superimposed coding. In this case letter-by-letter spelling out of the information is no longer required. Instead, words or numbers are assigned codes of varying hole locations within a fixed location (or field) on the card, and the codes for the various items are then all punched into this one field. Unfortunately, although this gives the required code combinations (in a retrieval search), spurious combinations are also possible. A manual analysis of the answers is then necessary to delete the 'false drops'.

H. P. Luhn, of the IBM Research Centre, has proposed row-by-row scanning (as opposed to column reading) of eighty-column punched cards. Allowing the space of approximately eight card columns for control functions leaves a maximum row length of seventy-two positions. In terms of permutations, a field of seventy-two positions can produce an enormous number of code combinations. This is a fairly attractive idea, but unfortunately, unless special equipment becomes available, row-by-row card preparation cannot be done efficiently.

All these considerations eventually led to the last hope, in the form of punched paper tape. The most cheerful fact to emerge immediately is the relative cheapness of the paper tape itself, compared with the next cheapest medium, punched cards:

	Cost	*Character capacity*
Paper tape, per thousand feet	8*s*.	120,000
Punched cards, per thousand cards	81*s*.	80,000

Since cost is always a prime factor, paper tape starts out with a pretty good advantage; unfortunately, compared again with punched cards, it loses very heavily on the question of handling convenience, and sorting potential. However, if used in conjunction with an electric typewriter, automatic operation of the typewriter may be obtained. Obviously, even without computer complications, such an automatic typing ability cannot fail to be useful, especially if at any stage in the existing system the same information is separately typed more than once. It is not unusual for typing to be repeated several times in a normal library routine, so that the saving in checking time alone is almost enough to make consideration of such a system well worth while.

In practice the tape typewriter consists of a fairly standard electric typewriter, combined with a coding and decoding mechanism, together with a punch and reader. As the typewriter key is depressed, at the same time that the character is typed in the usual way, an electrical signal is passed to the coding unit. This selects a pattern of holes to be punched across the paper tape, corresponding to the character typed. On feeding the length of punched tape back through the reader attachment, the typewriter will automatically reproduce in printed form the information originally typed and punched. If desired, a duplicate (or second generation) tape may also be punched at the same time. By using additional keys (not on the typewriter keyboard), certain special-purpose codes may be punched on the tape, but obviously no corresponding character will be typed on reading from the tape. Special codes like this can be used as instructions to a computer when used as a computer input, and one of the most useful of these is the 'Non-Print' code. When this code is read from a tape going through the reader, there is no corresponding reaction from the typewriter, which in fact stops typing until a 'Stop' or 'Print Restore' code is read. The more useful, but not very obvious, application of this code is in the selective reproduction of information punched on to the tape. On reading a first generation tape, the typewriter will stop typing when a non-print code is read, but the reader will go on reading the tape. Typing will not commence again until the print restore code is read, so that any information punched on the tape between these codes will not be reproduced. If a second generation tape is produced at the same time as the first is being read, a method of reproducing the non-print information is achieved, since the non-print instruction codes will not appear on the second generation tape. This procedure would have obvious advantages in a library which produces different index cards (author, subject, etc.) by multiple typings of almost the same information.

When Calvin Mooers first suggested his tape typewriter plan, there was virtually only one machine readily available in this country, but now there are several, and these include the Friden Flexowriter, the Smith Corona Typetronic, the Creedomat and the Bima, and others are expected shortly from Remington and Underwoods. It is to be hoped that the new IBM 72 typewriter will also soon be available with tape attachments. There are obviously many detail differences in all these machines, and it is not for me to recommend any one over another without knowing the details of the application envisaged.

Having decided on a likely method of producing a machine readable record, the next step was to examine existing procedures in the branch to see whether such a system could be used in such a way as to improve current efficiency and save staff (an optimistic target). This may seem like putting the cart before the horse in deciding on the machine first, but of course it is essential to know the capabilities and costs of the various machines available before attempting to specify one of them. The most obvious place to employ an automatic typewriter in any system is at a stage of typing which precedes multiple typings of the same (or nearly the same) data. Unfortunately for us, there was no cut-and-dried stage which filled this requirement, as most operations had already been reduced to one typing or at most two, the first generally being used as a draft. To show a saving as a by-product of the provision of the machine record was accordingly difficult, although marginal gains seemed possible. The stage in the current TIL process in which incoming material is recorded and indexed was therefore critically examined and after ironing out subsection differences, the following process appeared to show some promise.

The recording staff would mark the report itself to indicate the required bibliographic details to the machine-typist, and the abstractors would mark or edit the author's abstract in the same way, at the same time adding classification headings and inserting distribution recommendations on a special document movement card. The typist would now type on to a special abstract sheet (possibly an envelope for subsequent tape filing), copying entirely from the report (using a standard programme code format) and simultaneously producing a punched first generation tape. The typed abstract sheet is used as a visual typing check and is subsequently attached to the tape to assist in editing the accessions bulletin. If in envelope form, of course, it is finally used for tape storage.

The first use of the tape can now be made to complete what we call the 'movement card'. This card records bibliographic details of the document, number of copies, distribution made, requests, etc.; the bibliographic detail section, normally handwritten, can be obtained by running the tape back through the machine and typing on to the card from it. By minor redesign of the card, it appears possible to include the extra abstract and classification details. This stage is also a check on the correctness of the original typing and code punching.

The second use of the tape is to produce the accession list and index cards. Under our current system the bibliographical details together with the abstract are typed from the abstract sheet on to a stencil, in exactly the form in which we require the details on the cards. The stencil is arranged to cover four complete items per page of the accession list; subsequently the same stencil is used to produce the same four items on sheets of stiff card. These are chopped into four, to give four index cards, and this is repeated for every page of the list to give us something like fifty copies of each card. Now quite obviously it would be uneconomic to produce cards by typing them directly from the tape, since this would occupy the machine more than full-time to produce fifty copies of each card (about seven copies would be a likely economic maximum), so that the stencil is still necessary to provide the number of copies required. In actual fact the proposed scheme hardly alters the current method of accession list and card production; the only difference is that it is proposed to cut the wax from the tape.

To cope with an annual intake of approximately twenty thousand items, four tape typewriters would appear to be necessary, and on this basis we would hope to save one typist out of the four at present required. Other advantages would be the elimination of nearly all handwriting for both technical and clerical staff, together with a reduction in the number of stages and the inclusion of more information (the abstract) on the 'movement card'. These advantages are also estimated to produce a saving of one to one and a half out of six clerical grades at present employed on the recording process.

One of the difficulties inherent in the proposed system is the necessity of using the author's abstract whenever possible. On this question, G. A. Boutry, Secretary of the Abstracting Board of the International Council of Scientific Unions, has had this to say[3]:

> 'Objections to the use of authors' abstracts have, from time to time, been raised by the editors of abstracting journals, especially on the alleged tendency of authors to exaggerate the importance of their own work and write at too great length. This could be overcome if editors of scientific journals accepted

> responsibility for ensuring that abstracts were reliable, impartial and informative, and followed the simple lines drawn up by the Royal Society of London in 1946 and adopted by UNESCO in 1948.
>
> The use of authors' abstracts meets with opposition also on the grounds that it does not satisfy the special requirements of the readers of abstract journals. Adoption of the author's abstract has now become a necessity to progress in scientific documentation, and the advantages it could secure should amply compensate for any imperfections that readers have to bear.'

Having theoretically incorporated four tape typewriters into the system with marginal staff gains and an overall improvement in efficiency, it now becomes necessary to ensure that the machine record provided will be of use in a future computer. Once the information required for an index card has been coded on to paper tape it could straightaway be fed, in this form, into a digital computer (although a conversion to magnetic tape might be desirable first). There is one great difficulty here in which the computer limitations have to be recognized—there is no simple way in which a computer of this type (which basically recognizes only on/off signals or signal/no signal conditions) can identify, separately, the various components of the information on the length of tape representing the card. In other words, how is the computer to know where the authors' names end and the abstract starts, or where the originator's name ends, and the title starts? If each of these items of information were arranged to take up a set number of codes on the tape, and each item was separated from the next by a set number of spaces, then the computer could segregate them by simply counting codes along the tape. This is an almost impossible condition to achieve. Another possibility might be to specify that if every entry begins with, say, a P followed by a number (as in a TIL accession number), then at least separate entries can easily be segregated. Unfortunately even this has its pitfalls, if for example the entry concerns the Hawker P1127 aircraft!

Simplicity is always a good idea, so something like an asterisk or series of punctuation marks could be used to separate the items, and this is the course adopted by DSIR Mechanical Engineering Research Laboratory.[4] The main drawback to this idea is that the asterisk would also appear on the abstract card and accession list, when produced from the tape.

The only really practical suggestion (so far) has been made by Calvin Mooers requiring the use of a non-printing character, NPC, placed in the typewriter keyboard and represented by the symbol ▽. The start of a new entry on the tape could now be marked by, say, ▽ ▽ ▽ ▽, and although this could be recognized by the computer, the typewriter would not respond so that printing would not take place. In the same way, various combinations of this NPC could be used to separate authors and originators, title and abstract, etc. Such a system is workable, and ASTIA[5] have also adopted more or less the same scheme. This actually means the sacrifice of one of the characters on the keyboard, but this would not be serious if, for example, the asterisk symbol was dispensed with.

An interim solution to this important question would be to marry the two methods outlined above, by using, say, the asterisk, preceded by the non-print code, and followed by the print restore code. The marker asterisk would not now appear when typing from the first generation tape in the production of the accession list and index cards, but it would be present on the second generation tape, and would be recognizable by the computer. This is not really recommended since it requires two extra keying movements for each marker code (i.e. 'non-print' and 'print restore'). Failing any other suggestion, or unless we can be sure that a future generation computer will not need such spoon-feeding, we propose to use a non-printing character, represented by ∇, as an item-separator symbol.

The most difficult problem of all has still to be faced, namely that of devising a machine index which will enable the information stored to be retrieved. On this question, the Assistant Director for Technical Information Service, US Atomic Energy Commission, in February 1960 had this to say[6]:

> 'In addition to the scope of coverage, a very important decision is necessary on the depth of indexing. If we are to index no more deeply than we do currently, then perhaps a machine system would be too costly. For deep indexing, with many points of retrieval per document, a machine system seems to be the only answer . . .
>
> Work should be started immediately on a dictionary or dictionaries of key words (descriptors) for use in a machine system. This task is in the province of the Library Committee. That committee should consider the problem of whether a single dictionary can be devised to cover all of the technical literature, and if not, to suggest alternatives. It might be discovered that the technical literature could be divided into a number of broad fields with a descriptor dictionary for each.'

The existing TIL index is UDC, and, although suitable for manual retrieval, its efficiency as a machine index is dubious. The arguments against perpetuating an index in a form which is unsuitable for mechanical retrieval are obvious and fundamental, so that a new index seems to be essential. It is possible that in two to three years' time a computer could be programmed to convert automatically from one index to another, so that a new index might not be necessary as long as the existing one is in machine form—but this is effectively shutting one's eyes to the problem. The old index and a new one can be run at the same time, keeping them completely separate and independent, although this seems rather wasteful. In spite of the obvious cogent arguments against double indexing, it would certainly pay dividends in any interim period, and would allow any new index to be tested before being adopted as the main and only index.

The decision as to the type of index to be used is also difficult, and one of the suggestions is that a thesaurus type index on the lines of the ASTIA edition[7] should be used. This would require a co-operative effort by the technical staff to produce a suitable thesaurus, possibly based on the ASTIA version.

These problems have yet to be resolved, and they are made more difficult by the necessity of having to work in the dark with regard to the potentialities of future computer systems. In all the foregoing it should be remembered that this has been a theoretical study and, as is generally the case, the light of experience will show whether the scheme is practical enough.

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SCIENTIFIC INFORMATION AND PATENTS

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NOT a very exciting title, particularly that word patents, which conjures up documents often difficult to read and even more difficult to understand. There is really no need for a patent specification to be more obscure than any other well drafted technical description; unfortunately jargon has crept in mainly with the intention of being less restrictive and now much of it is due to what I regard as a rather lazy habit.

I do not propose, this afternoon, to talk about the mechanics of patents, by which I mean the various processes and formalities associated with the filing and prosecution of patent applications up to the stage at which a patent is granted. Normally these are unlikely to be of much interest to you but there are occasions during the life of a patent when the information officer may be able to help or indeed make an important contribution.

As every information officer and librarian knows, the first problem with a customer is to find out what he really wants to know and to translate his question into a form which will make it possible to produce the information he needs. The same problem arises in looking for information in patent searches and I hope to tell you enough about the basic nature of patents and the problems which arise with them for you to be able to give useful help when called upon by, for example, the patent department or patent advisers of your firm.

I will start with a little history. Letters Patent—to use the formal term—are granted by the Crown and can be granted for things other than patents for invention. But we are concerned with a patent which is a monopoly and moreover is also a patent for an invention. In the good (or bad) old days the Crown was extravagant, favourites were expensive, and money was difficult to extract from Parliament. The ruling monarch found that the royal power to grant patents of monopoly could make a useful contribution to the privy purse, and although the basic idea of granting patents of monopoly to individuals who made new inventions or introduced new trades from abroad was sound, many abuses soon grew up. These monopolies took various forms, such for example as one granted to John Kempe, a Flemish capitalist, by Edward III, to revive the decaying wool industry; or to Sir Walter Raleigh by Queen Elizabeth I for the right to issue licences for keeping taverns and retailing wines. The worst type were those in which a settled trade was handed over to one or more persons for personal gain; in those cases the Crown did not make a great deal, but the monopolist made great profits by extortionate charges to the public. Examples of monopolies of this type were saltpetre, glass-making, soap-making, playing cards, starch, and vinegar, and the situation became so bad that the main commodities were monopolies in the hands of profiteers. To abate the abuses, Parliament passed in 1623 the Statute of Monopolies—the foundation of our present patent law. The Statute of Monopolies pronounced illegal all monopolies 'for the sole buying, selling, making, working or using of any thing', but in Section 6 made the exception 'provided that any declaration before mentioned shall not extend to any Letters Patent and grants of privilege for the term of fourteen years or under hereafter to be made of the sole working or making of new manufactures within this realm to the true and first inventor and inventors of such manufactures, which others at the time of making such Letters Patent and grants shall not use, so as also they be not contrary to the law nor mischievous to the State, by raising of prices of commodities at home, or hurt of trade, or generally inconvenient . . .'. The present Patent Act is based on this original statute and has grown to its present length and complexity as a result of needs which have arisen in an industrialized community or to remedy defects made evident by decisions of the Courts.

There is, I believe, a good deal of confusion about what a patent is and what benefits it confers on its owner. One often hears the remark 'He can make that because he has got a patent for it'. Nothing could be further from the truth. Firstly an individual can make anything he likes as long as someone else has not got a monopoly which stops him, so he doesn't need a patent in order to make something he has invented. Secondly a patentee, though he can stop everyone else from making or using the invention he has patented, may not himself be able to make, use or sell his own invention without infringing an earlier patent or coming to some arrangement with the inventor of that earlier patent. You will thus appreciate that a patent is not a positive thing like a piece of land but a negative thing—namely the power to prevent others making, using or selling what has been invented without the permission of the patentee, which in practice usually means without the payment of a royalty.

You are doubtless all familiar with the form of the printed specification which can be purchased at the Patent Office; the actual grant, however, comprises a parchment document reciting the terms of the grant by the Crown and bearing the seal of the Patent Office. Enclosed in this document is a copy of the printed specification.

Having obtained a patent, the owner will want either to make the invention himself for commercial profit or to assign or license the patent to someone who will exploit the invention. At the same time, of course, it will be necessary to prevent would-be competitors from using the invention or from making and selling something which is so like the invention as to infringe the claims of the patent. For those not familiar with patent specifications, I should explain that the claims at the end of the specification define the actual invention for which a monopoly has been granted.

So far I have talked only about patents and said nothing about scientific information. I now propose to discuss the type of case in which the information officer may have a considerable contribution to make. Let us suppose that the patentee, or perhaps the firm to which he belongs, is making and selling the invention, and a competitor starts selling a somewhat similar article which the patentee regards as infringing the claims of his patent.

I should perhaps say here that I am trying to keep my terms simple, to be as general as possible, and to avoid patent or legal jargon. Accordingly, when I talk about 'making or selling an invention' you must understand that this is intended as a very loose generalization for making or selling an article including the inventive feature claimed in the patent, using a patented process, or indeed any other activity involving use of the invention which has been patented.

To revert to our case, the patentee, confident of the strength of his patent, sues the competitor for infringement, and claims, usually, an injunction to stop the infringing manufacturer and damages. The competitor, who may well have considered, with his advisers, the risks involved before he started the competitive production, will reply, in defence, first that he is not infringing the patent and secondly that it is a bad patent anyway. Probably some months before this stage, the two sides, their patent advisers and often their information departments will have done a good deal of searching, but it is likely that more will need to be done as each side files the documentary supporting evidence before the case gets to the Courts.

What contribution might the information officer make to the patentee's case? An alleged infringement may be quite straightforward in that the infringing article can be purchased and produced in Court, though there may well be legal arguments as to whether or not it does in fact infringe the claims of the patent. Often, however, it may be a complicated machine having some feature which infringes, but such a machine cannot be brought into Court and it is certainly useful to produce for the judge some documentary evidence in support of the alleged infringement. People are sometimes strangely careless and the competitor's literature may sometimes be helpful. I personally had an experience which illustrates this. Many years ago when I was in the information department at Metropolitan Vickers, there was an important patent action against British Thomson Houston (then competitors and not part of AEI) on the starting of rotary converters. There was no doubt that BTH had used the Metrovick starting system in rotary converters they had sold but there seemed to be no documentary evidence, though it was believed that BTH had done some advertising of a starting system like the Metrovick one. The Patent Department came to the Information Department for help. I, like most students, had been to such engineering exhibitions as I could find and collected all the brochures and pamphlets I could scrounge. When this inquiry came, I remembered a collection I had made at a BTH stand at Olympia and I found amongst my collection a pamphlet which had subsequently been withdrawn but which showed a clear wiring diagram of the Metrovick system as offered by BTH. That pamphlet became useful evidence in the case right up to the House of Lords where judgment was eventually given in Metrovick's favour. I can only say from this that other people's brochures, which sometimes seem to be such a nuisance in a library, may occasionally be useful after all.

Now let us turn to the other side, namely that of the alleged infringer. Whether or not a claim of a patent is infringed is a question of fact though of course the exact interpretation of a claim depends on a number of factors, which are in the province of the expert witnesses, the lawyers, and the Courts, not of the information officer.

Suppose, however, that you are in the information department of the company which has been accused of infringing a patent and the patent people in your firm come to you for help in trying to knock out the patent, what sort of things do you search for and what is needed to prove that a patent is invalid? I propose to try to tell you in general terms what is required.

The first question is what are the requirements of a patent that it shall be valid. There are four major ones. The first is that the invention is novel, the second that it has 'inventiveness' or, as it is usually called, patentable subject matter, the third that the invention is useful and the fourth that the patent specification itself is adequate or, to use the legal term, sufficient.

As it can be dealt with quickly and doesn't concern you much I will deal first with the 'sufficiency' of the patent specification. A patent is a bargain between the Crown and the inventor, who is granted a monopoly for a term of years in exchange for fully disclosing his invention, so that when the monopoly term expires the public (usually regarded as those skilled in the art) is not only free to work the invention but also has the knowledge to do so. The inventor is required, in his complete specification, to describe the nature of his invention and also the best way known to him at the time of carrying it into practice. From this it follows that if the specification does not 'sufficiently describe and ascertain the nature of the invention and the manner in which it is to be performed' the patent can be attacked for insufficiency. Moreover if the description of any of the practical examples of the invention won't work, then the patent may be held invalid. The question of sufficiency is one of fact and expert evidence in each case but there is, of course, no reason why you should not express any doubts you may have on this score. The utility of an invention is normally a question of fact and argument between expert witnesses so I won't spend any time on this.

Now we can discuss the question of novelty. An invention is anticipated by public use before the date of the parent application but such prior use is not normally established by an information search and therefore I will not discuss it in any detail. Before you can make a search for material (prior art) to anticipate an invention, you have to get a very clear idea of the invention itself. It is defined in the claims at the end of the complete specification. Usually the first claim is the most important, though if there are other claims not dependent on claim 1 they too need consideration. Sometimes the claims—always to be read in conjunction with the specification—are very puzzling and then it is important that you obtain from your patent people help in defining what has to be anticipated by your search. A publication to be useful must have been available to the public before the date of the patent application (or before the priority date claimed under the International Convention in the case of an application based on one first filed abroad); and the publication, if a British or foreign patent specification or an abridgement thereof, should not be more than fifty years old. The date on which a publication became 'available to the public' is not the same as the announced date of publication and needs to be proved by reference to the records, etc. of a library or other place where the publication is available to the public. Each book and periodical in the Patent Office Library bears a rubber-stamped date which is the date it is put on the shelves. A brochure or a technical report widely distributed to the firms in the industry concerned or 'those skilled in the art' can be an effective prior publication provided the distribution can be established to the satisfaction of the Court and, of course, it takes place prior to the date of the application.

If in your search you find a prior publication which completely anticipates the invention, or even one of the examples in accordance with invention described in the specification, then you will have succeeded beyond normal hopes, but it is seldom as easy as this. Sometimes one finds what the Court has called a 'paper' anticipation—that is an earlier description which does not itself reveal the actual invention but which, in the light of the later knowledge of the invention, could be said to anticipate it. A prior publication will not invalidate a patent merely because a person of great skill could have derived the invention from it. In one case a judge said 'Where the question is solely a question of prior publication, it is not, in my opinion, enough to prove that an apparatus described in an earlier specification could have been used to produce this or that result. It must also be shown that the specification contains clear and unmistakeable directions so to use it.' There is, on this question, as indeed on most patent problems, a wealth of case-law, but I will content myself with saying that when you find what seems like an anticipation remember to consider it in the light of knowledge before the invention was made; it is very easy, knowing all about an invention, to interpret an earlier document as much more pertinent than it really is.

An attempt to do this was made in the case on the starting of rotary converters to which I have already referred. Rotary converters with starting motors had previously had the starting motor and the main armature separately supplied and the main difficulty in operation was in synchronization. The invention consisted in connecting the starting motor and armature windings in series during the starting period and finally shorting out the starting windings; this avoided synchronization problems. In their attack on the patent the defendants relied on a prior specification of Tesla which illustrated a device that could have been used to produce the required result if the operator had had in mind the need for synchronization: but no one before the patentee (Rosenberg) had conceived the advantage of its use this way. In one of the judgments in the Appeal Court it was said 'the anticipation by Tesla . . . is contained in an American specification more than twenty years prior to Rosenberg's invention. This specification had been deposited in the Patent Office Library here and had thus been accessible to the public; and it follows that its contents were part of public knowledge. But there is nothing to show that these contents were part of common knowledge. . . . Any anticipation, therefore, by this specification is a mere paper anticipation and must therefore satisfy a very strict test if it is to prevail'. The paper anticipation did not satisfy the test and the patent was upheld.

Turning to the next of the requirements, namely the need for inventiveness or patentable subject matter, I think I can best explain this by a simple example from an old case. A patentee used a fish plate for joining the ends of railway rails; this was novel but it was known to use fish plates for joints in other mechanical structures, notably in the beams of bridges, and it was held that there was no inventive ingenuity (or subject matter) in using a well-known contrivance (a fish plate) for a purpose analogous to the purpose to which it had previously been applied. Thus, if you find a prior publication which, though not an anticipation, seems to you to be only removed from the invention by a step which would be obvious to someone reasonably skilled in the art, then that publication may be helpful. The substitution of a well-known mechanical equivalent, even though it may result in a novel article, is not normally a patentable invention.

As many of you know, an invention may consist of a combination of two, three or more elements, any or all of which may be quite well known in themselves. If the combination is made up of known elements, then it can in general only be the subject of a valid patent if the bringing together of the known elements produces a new, unforeseen, or better result not found in the individual elements taken by themselves. The well-known sausage-machine case is an example of a combination which proved not patentable. The patent was for a machine for mincing meat and filling the minced meat into skins to make sausages; in fact it consisted of a well-known form of mincing machine combined with a well-known form of filling machine, but each part of the combined machine functioned only in its known way so that there was no invention in bringing them together into a single structure. However, here again I must add a word of warning; it is often dangerous to try to anticipate an invention—whether it be for a combination or not—by bringing together a number of documents and saying, for example, when document A is viewed in the light of documents B and C, that there is no inventive ingenuity or even that the invention is completely anticipated. It has been said frequently in the Courts that an invention is not invalidated by a mosaic of such a nature or even that the selection of the appropriate integers from such a collection of documents might in itself constitute a patentable invention.

There is another rather different aspect of patentable subject matter although normally it is unlikely to be of such concern to information officers as that I have already discussed; that is whether an invention is in fact a 'manufacture' within the terms of the Statute of Monopolies, because if it is not, then it cannot be patented. The meaning of the word 'manufacture' as applied to patentable inventions has expanded over the years, but I will give you a few examples to illustrate some of the things which can and cannot be patented. First it is necessary to distinguish between discovery and invention in the sense that a principle of nature can be discovered but not invented; thus a principle cannot be patented although it is possible to patent a method of using the principle so as to apply it to the production of a new manufacture. In general it is not possible to patent a new material as such, but a novel method of producing it can be patented together with claims to the material when produced by that process; normally it will be assumed that the material is produced by the patented process (and thus infringes the patent) unless the contrary can be established.

Coming to things of more direct interest to you, it is not possible to patent systems which cannot be classed as manufactures, such, for example, as methods of indexing or arranging correspondence, which would, of course, include retrieval systems, although it is possible to patent novel apparatus required for working such a system or method. Gardeners amongst you will know that it is not at present possible to patent new roses or hybrids, although there is a strong movement afoot to provide some form of protection for horticulturists introducing new varieties.

I have tried to cover a large amount of ground in a short time and I have no doubt that the purists will say that I have omitted much of importance, many decided cases and have generalized dangerously on a difficult and controversial subject. I shall however have succeeded in my task if I have given you some ideas of what is required and what may be useful when you have to undertake a patent search. It is worth remembering that despite case-law and precedents, each new case has special problems which are open to doubt; it would never get to Courts if opposing opinions were not possible.

I propose to conclude with a short story which I believe explains the relation between a master patent and improvement patent simply in a way which can easily be remembered. As this story borrows characters from Kipling, it starts in a Kipling way.

In the high and far-off times, O best-beloved, Man, who was then very primitive, ate raw eggs; he didn't know any other way to eat them. One day Tegumai, whom you may remember from Just So Stories, was playing with an egg and it fell into a pot of water which was boiling on the fire outside the entrance to the cave. He managed after some time to fish it out of the water and then he ate it; it was very good, much better than a raw egg. Tegumai decided he would take out a patent; he was able to do this because, you will recollect, he and his daughter Taffy had just made the alphabet. In his patent Tegumai had two claims, the first, 'A method of making eggs edible which consists in heating them' and the second, 'A method of making eggs edible as claimed in claim 1, in which the eggs are boiled'.

Now there was a far-off tribe called the Tewaras and one of them was a friend of Taffy's. Taffy called him Stranger-Man. Well, for a long time he had not visited Taffy, so he hadn't heard about the boiled eggs, but in his far-off place he too played with an egg and he dropped it on to a plate which was getting hot over the fire outside his cave. When Stranger-Man had scraped it off the plate, he ate it; it was very good. He too applied for a patent, with a first claim like Tegumai's first claim and a second claim to 'A method of making eggs edible as claimed in claim 1 in which the eggs are fried'. The examiner told him that he couldn't have the first claim, that he must say in his specification that it was known to make eggs edible by heating them, but that, as it was novel to fry them, he could have a claim to 'A method of making eggs edible which consists in frying them'. So there were two patents, Tegumai's a master patent with a broad claim covering every method of heating eggs to make them edible and the Stranger-Man's a narrow improvement patent to frying eggs, a method of heating them which Tegumai had not thought of.

Now what happened in practice; every time the Stranger-Man fried an egg he infringed Tegumai's patent and therefore he had either to stop frying eggs or to obtain a licence from Tegumai and pay a royalty. If he did neither of these things, he was liable to big damages. But suppose Tegumai wanted to fry eggs; if he did he would infringe Stranger-Man's patent so he must either not fry eggs or pay a royalty.

I hope this story shows how it is that whilst the owner of a master patent can collect a royalty when anyone does something which falls within the terms of his broad claim, he may himself, despite his master patent, have to pay a royalty in order to do something claimed in a later improvement patent. It also shows that the owner of an improvement patent cannot work his invention if it happens to infringe someone else's master patent unless, of course, he pays a royalty.

Letter to the Editor

CHEMICAL ABSTRACTS—INCREASED RATES

Dear Madam,

The American Chemical Society has announced increased rates for *Chemical Abstracts* in 1963. The revised price to ACS members and to colleges and universities will be $500 annually, and the rate to all others will be $1,000. Previous rates were $40 for ACS members, $200 for colleges and universities, and $925 to others (excluding postal charges).

The ACS realizes that the new college and university rate will cause hardship, especially to smaller colleges, and suggests that colleges actively seek donors to help pay for *CA*, among industrial groups and possibly from government sources.

At the same time *CA* will be available in four major groupings of sections, which can be purchased separately. These are *CA* bio-chemical sections, already available; *CA* organic sections; *CA* physical chemistry sections, including selected analytical and inorganic sections; and *CA* macromolecular (natural and synthetic) sections. Each issue will be provided with a keyword index of contents of the entire *CA*. Each of these groupings, issued every two weeks, will be priced to academic institutions at $25 per year. These four section groupings represent about 80 per cent of the entire *CA*, but do not of course include the important annual indexes.

College libraries will need a substantial increase in their annual vote to meet the increased cost of *Chemical Abstracts*, *Physics Abstracts*, *Electrical Engineering Abstracts*, and many other journals that have substantially increased subscription rates. The steep rise in the cost of periodicals, with demands for new titles, leaves little enough for books and binding in advanced colleges (colleges of advanced technology, regional colleges and other colleges undertaking research).

In view of the difficulty in the past in securing an adequate vote for the library in competition with other departments, perhaps industry or the Department of Scientific and Industrial Research could assist in the matter, especially in the case of subscriptions to abstract journals.

E. R. YESCOMBE,
Librarian

Northern Polytechnic, London N7
5th September 1962

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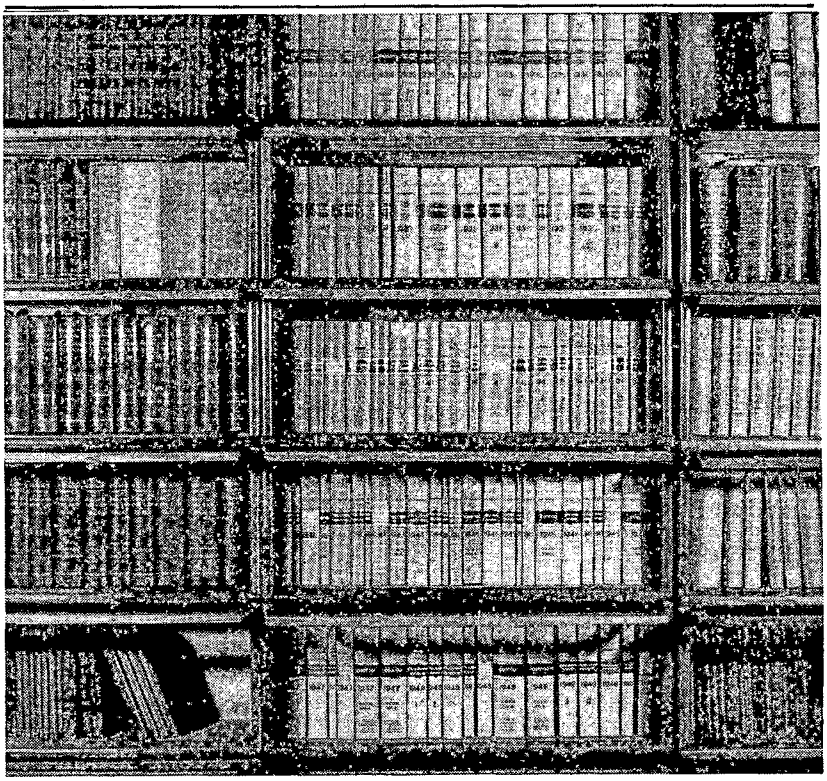

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Aslib Proceedings

incorporating Aslib Information

Desirable Ratio of Professional and Non-Professional Library Staff

GEO. H. DAVISON

An Outsider inside Information: USA 1961–1962

R. A. FAIRTHORNE

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b Proc. vol.14 no.11 p.355-394 London, November 1962

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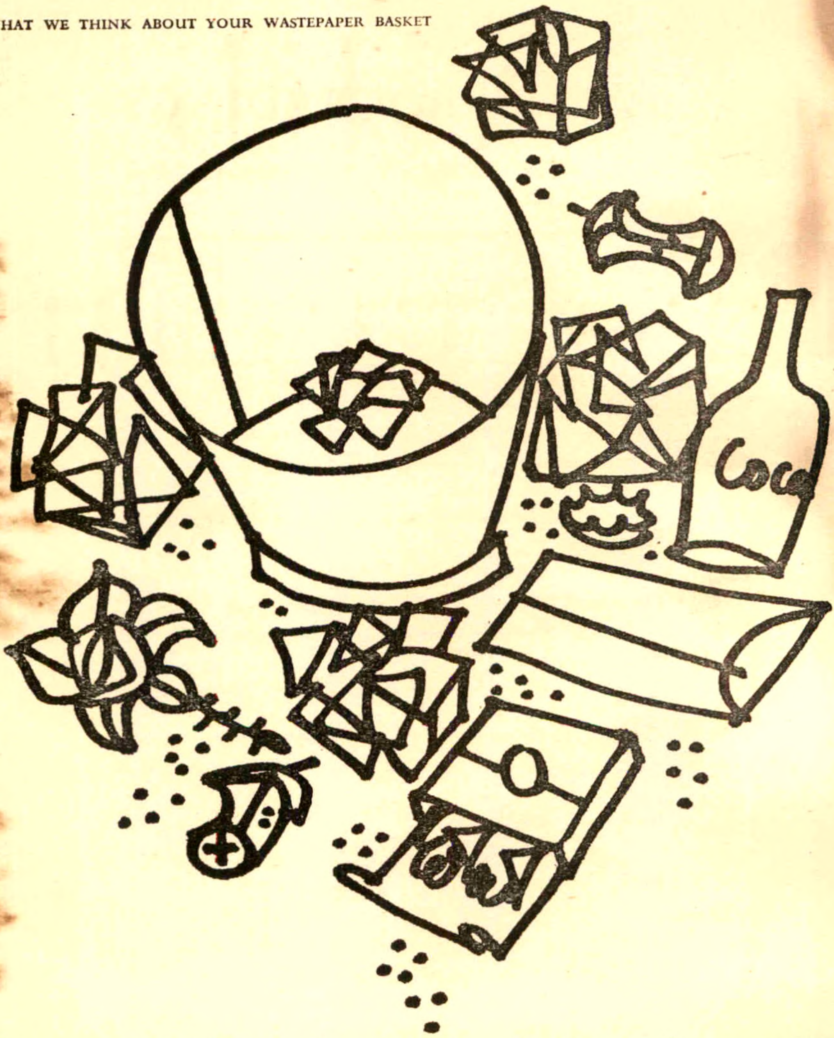

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 **November 1962** **Number 11**

ASLIB CALENDAR 1962

November

MON.26. Winter meeting at Aslib. 'The implications to industrial and other special librarians of the new L.A. examination syllabus' by L. G. Patrick.

THUR.29 – FRI.30. Course on using foreign languages in information and library work.

December

MON.3. Technical Translation Group meeting at Aslib.

TUE.4. Midlands Branch meeting, Birmingham. See paragraph below.

TUE.11 – FRI.14. Repeat of junior introductory course to information work. See paragraph below.

WED.12. Midlands Branch meeting. See paragraph below.

WED.19. Christmas sherry party at Aslib. See paragraph below.

1963

January

MON.14 – FRI.18. Senior introductory course to information work. See paragraph below.

February

TUE.5. Meeting on Aslib Cranfield Investigation at Royal Aeronautical Society. See paragraph below.

March

MON.25. Midlands Branch annual general meeting.

April

FRI.5 – SUN.7. Aeronautical Group and Engineering Group joint conference at Cranfield.

WED.17. Course on reference work at North-Western Polytechnic begins.

TUE.23. Midlands Branch 'summer meeting' at Coventry.

May

TUE.7. 'Information on a shoestring'—a course for part-time information workers at Nottingham.

June

FRI.14 – SUN.16. Electronics Group annual conference at Ashridge College.

Madame Ravage

The news of Denise Ravage's death will have come as a sad shock to her many friends and professional colleagues throughout the world; and, since so much of her career was in national French bibliographical service of the highest international importance and for ten years in the United Nations and in Unesco, the phrase 'throughout the world' has real meaning.

I only want to write of her period as my colleague and dear friend in Unesco. Unesco's bibliographical programmes were exceptionally difficult to organize and to carry into effect because they concerned all the varied and contentiously conflicting areas of the Organization's work: they demanded erudition and professional expertise which Denise Ravage had abundantly, and patience and tact in delays with administrators which came to her less easily. She was at her excellent best in tackling hard technical problems and was wonderfully imbued with the essential qualities of an international civil servant in building her world-wide contacts on the two firm pillars of intellectual respect and friendship.

E. J. Carter.

Aslib Cranfield Investigation

The final report of the Aslib Cranfield investigation has now been published with the title *Report on the testing and analysis of an investigation into the comparative efficiency of indexing systems.* An earlier report dealt with the first stage of the work, which involved the indexing of 18,000 documents by four different systems. The new volume of 312 pages contains the results of the test programme (for which 7,000 searches were made in the four indexes) together with the detailed analysis which shows the main factors affecting the efficiency of information retrieval systems. Copies of the report can be obtained from Mr C. W. Cleverdon, The College of Aeronautics, Cranfield, Bletchley, Bucks. The price is 35*s*.

It is intended to hold a one-day meeting on Tuesday 5th February 1963 to discuss the results of this investigation and a programme of work for the next two years. Papers will be given by the Project Director, Mr Cleverdon, and by Mr Jack Mills and Mrs J. Aitchison. The meeting will be held at the Royal Aeronautical Society, 4 Hamilton Place, London W1. A leaflet with further details is being distributed with this issue of *Aslib Proceedings.*

Senior Introductory Course to Information Work

A senior introductory course to information work will be held at Aslib from 14th to 18th January 1963: It is intended for people entering information or special library work with a university degree or equivalent qualification, or for other senior persons placed in charge of information departments without previous experience of work of this nature. It will introduce them to the basic principles governing the production and handling of information and acquaint them with some of the practical details of the operation of an information service or library. In addition to lectures there will be conducted visits to a variety of special libraries and information departments, and time will be allowed for discussion. The fee for the course will be £10. Intending students are advised to apply early on the form enclosed with this issue. Provisional bookings by telephone will be accepted. Students not having the necessary qualifications or status will not be accepted and any who are in doubt if they fulfil these requirements should consult the Education Officer, Mr Bird.

Junior Introductory Course to Information Work

The junior introductory course to information work held on 23rd to 26th October (for full details see *Aslib Proceedings*, September 1962, p. 268) will be repeated on 11th to 14th December. This is mainly intended for those who were too late to obtain places on the previous course and who will have been notified of it, but a number of fresh students can be accepted. The course is suitable for those students who do not fulfil the entry requirements of the senior introductory course. Those who wish to obtain places should write to the Education Officer, Aslib, enclosing the fee of 5 guineas. Provisional bookings by telephone will be accepted.

Aslib Christmas Sherry Party

Encouraged by the success of our 1961 party, we are making arrangements for a similar one to be held at Aslib on Wednesday 19th December from 5.30 p.m. to 7.30 p.m. This year there will also be a small display of special library literature and equipment arranged by the Aslib Library staff, which will be on view in the Library (ground floor) from 4 p.m. until 7.30 p.m.

Admission will be by ticket only, available from Aslib at 7*s* 6*d*.

Midlands Branch

Mr J. B. Davies, of IBM British Laboratories, will be the speaker at the Midlands Branch meeting on Tuesday 4th December, on 'Computers in libraries'. The meeting will be held at the Engineering Centre, Birmingham.

The Branch will hold a half-day conference on 'Productivity and information: local and national resources', on Wednesday 12th December. The speakers will be Mr P. Spear of Rubery, Owen & Co. Ltd, Mr K. J. Rider of Birmingham City Libraries, and Mr K. Boodson of Imperial Metal Industries (Kynoch) Ltd, and the conference will be held at the Birmingham and Midland Institute. Further details of these meetings may be obtained from the Branch Hon. Secretary, Mr J. H. Seals, Librarian, College of Advanced Technology, Birmingham 4.

Northern Branch

A questionnaire on libraries' attitudes to part-time education in special librarianship and information work has been prepared by the Northern Branch Education Subcommittee, and will be circulated to Northern Branch members. If any non-member of the Branch would like a copy they should apply to the Hon. Secretary, Miss E. Boddy, at Edgar Allen & Co. Ltd, Imperial Steel Works, Sheffield 9.

Does Your Firm need its own Information Service?

This is the title of a booklet prepared by the Aslib Research Department for the Organization for Economic Co-operation and Development (OECD) which has just been published by the latter, in English and French editions. The booklet is addressed specifically to the managers of small and medium-sized firms and is designed to encourage them to ask themselves the question given in the title, and to help them to arrive at well-founded answers. Explicit practical instructions are given for determining whether it will pay a firm to set up its own information service. The emphasis throughout is on the small firm and the one-man information service, and no prior knowledge of libraries or information services is assumed.

The booklet is based to a substantial extent upon an investigation of library operations and costs carried out at Aslib by Mrs Margaret Slater, and some of the data collected are presented in an appendix; but the main text is essentially a simple statement of the case for an information service—supported by evidence—not a report of an investigation.

The booklet is published at 5*s* by the Publication Office, OECD, 2 rue André-Pascal, Paris 16. Copies may be borrowed from the Aslib library.

Information Courses

A further series of two-day 'appreciation' courses on methods of handling information will be held in 1963 by Messrs J. L. Jolley and Partners Limited. They will take place on 16th and 17th January, 13th and 14th March, and 8th and 9th May, at The Bell, Aston Clinton, Bucks. Earlier courses in the series were described in the June issue of *Aslib Proceedings*, and the syllabus and the fee (16 guineas) are the same as before. Further information about the courses and about travel and overnight accommodation can be obtained from J. L. Jolley and Partners Limited, 46–8 Frogmoor, High Wycombe, Bucks, and it is advisable to make reservations as soon as possible.

Course on Research Administration

There will be a four-week residential course on 'Administration and management of research and development' at Brooklands Technical College, Weybridge, Surrey, from Monday 14th January to Friday 8th February 1963. There will be emphasis on practical work, and the aim of the course is to help those who administer technical work and research in industry or in research associations. The fee for the course is 175 guineas, and application forms can be obtained from the Comparative Administration Trust, 30 St George's Street, Hanover Square, London W1 (telephone Victoria 5334).

New Scottish Research Association

A new research association, the Scientific Documentation Centre, has been set up at Halbeath House, Dunfermline. It will carry out research into the means of improving access to scientific information and will also maintain collections of scientific data, for the use of research organizations. Membership rates are £15 per annum for organizations and £3 for individuals. The Secretary is Dr P. S. Davison and the address is Scientific Documentation Centre Limited, Halbeath House, Dunfermline, Scotland.

Anbar Abstracts

The Anbar Documentation Service, now in its second year, has recently decided to offer its abstracts service alone to those libraries which do not require the full documentation service. Monthly coverage is offered of eighty journals on office organization, management and methods, from sixteen countries. Each issue contains 150 to 200 abstracts and the majority of journals are abstracted in the month following publication. The annual subscription for the abstracts service is £6. Details of this and of the full range of services are available from Anbar Publications Ltd, 34 The Mall, Ealing, London W5.

Bibliography of Social Work and Administration

The Joint University Council for Social and Public Administration has published the ninth supplement, 1961, of the *Bibliography of social work and administration: a classified list of articles from selected periodicals*. The following subjects are covered: social sciences, criminology and penology, economic and social conditions, health, labour, political science, population, psychiatry, psychology, social pathology, social services, social work, and sociology. The supplement is available from the Council at 218 Sussex Gardens, London W2, price 6*s*. Supplements five to eight are also available.

Meeting on the Literature of Nuclear Science

The United States Atomic Energy Commission's Division of Technical Information held a meeting on 'The literature of nuclear science: its management and use' in Oak Ridge, Tennessee, 11th–13th September 1962. About 150 people, representing ninety-five libraries and other organizations, attended, and speakers included members of the National Science Foundation and the American Institute of Physics. A highlight of the meeting was a talk by Dr Alvin M. Weinberg, Chairman of the Subcommittee on Science Information of the President's Science Advisory Committee, on the increasing importance of the specialized information centre. Copies of the proceedings may be obtained without charge from the Division of Technical Information Extension, US Atomic Energy Commission, PO Box 62, Oak Ridge, Tennessee.

Documentation Seminar

The Documentation Research and Training Centre, which is sponsored by the Indian Statistical Institute, is to hold the first of a series of annual seminars, in Bangalore from 5th to 10th June 1963. The Director of the seminar will be Dr S. R. Ranganathan and the theme will be 'Bibliographies of current literature'. Papers are invited by 15th December 1962 and details are available from the Convener of the seminar, Mr A. Neelameghan, at the Documentation Research and Training Centre, 696 Cross Road 11, Malleswaram, Bangalore 3, India.

NATIONAL CENTRAL LIBRARY

THE 46th Annual Report of the Executive Committee of the National Central Library, for the year ending 31st March 1962, records the resignation of Mr L. R. McColvin, and the appointment of Mr B. S. Page, as Chairman of the Committee.

It is hoped that work on the new building in Store Street can commence by New Year 1963.

The special project for incorporating in the Outlier Union Catalogue the arrears of entries from the Regional Systems was completed.

The Library took over the work of the British Union Catalogue of Periodicals Council on 1st January 1962. It is agreed in principle that publication of the union list should be continued but the form has yet to be decided.

The Librarian served as a member of the Ministry of Education's Working Party (B) set up to consider the practical implications of the Roberts Report concerning library co-operation.

It is considered that, with adequate funds, the Library could act as an effective national lending library, mainly in the humanities; care would be taken, however, not to duplicate much material already available elsewhere, as would be the case if a library of the same type as the National Lending Library for Science and Technology were set up to cover the field of the humanities.

The lease of a building on the Royal Arsenal Estate at Woolwich has been secured to act as a store which will hold about half a million books.

The stock of the Library was estimated as 184,000 volumes catalogued and 51,000 awaiting cataloguing. As from the beginning of 1962, all British government publications are being purchased.

The net total of applications dealt with (excluding adult classes) was 87,505, and 77.68 per cent of these (67,976) were satisfied; 3,699 loans were made by British libraries to libraries overseas and 2,550 items were borrowed from overseas. Loans were made to sixty-one countries and publications were borrowed from thirty-five countries. The 352 outlier libraries lent 18,880 items and a further 5,219 loans were made by other special libraries.

The British National Book Centre redistributed among British, Commonwealth, and foreign libraries 148,867 books and periodical volumes and parts.

DESIRABLE RATIO OF PROFESSIONAL AND NON-PROFESSIONAL LIBRARY STAFF

GEO. H. DAVISON
The United Steel Companies Ltd

Aslib Northern Branch Conference, 6th–7th July 1962

INTRODUCTION

IT is now over twelve years since I presented a paper to the Northern Branch of Aslib comparing the working of an industrial library with that of a public library.[1] Since then, there has been a considerable growth in the number of special libraries and this, together with the counter attractions of employment openings elsewhere created by the industrial situation, has resulted in considerable difficulty in obtaining the desired type of library staff. The present time, therefore, would appear to be appropriate to re-examine the staffing problem, particularly as it affects special libraries.

When the Aslib Northern Branch Committee decided to include this subject in the Conference papers, I was asked to speak from the employer's standpoint. I have interpreted this to mean what ratio will give the employer the maximum benefit, although I see no reason why this should not equally be in the interests of library staff.

NATURE OF SERVICES REQUIRED

A library has three important functions:

(*a*) to collect published information and make it readily available in an orderly fashion so as to keep readers up-to-date with technical developments;
(*b*) to make literature searches on request;
(*c*) to be constantly aware of the specific interests and needs of the staff it is servicing.

Function (*a*) involves keeping in touch with new publications in the special field of the library concerned. It also necessitates a system of publicizing what is available in this way. This may be by individual information circulars, by library bulletins or by accession lists. Library routine tasks such as classification, indexing, loan procedures, etc., will also be involved.

Function (*b*) is a vital service. In determining the novelty of a new project, it is essential for a literature search to be adequate as this is usually far cheaper than carrying out industrial research work. This literature search should, of course, be extended to books, pamphlets, periodicals and patent specifications but I realize that in the case of small undertakings it would probably be preferred to hand patent searches to a patent agent with greater experience.

On the other hand, it has been said that the searching of literature by high-grade staff is so expensive that it is frequently cheaper to get a direct answer by laboratory research than to find out whether and where someone else has recorded his findings. For instance, F. T. Sisco,[2] the vice-president for research of one of the largest American corporations, has stated that if a research job costs less than $100,000 it would be cheaper to do it than to find out if it has been done before and is reported in the literature. However, the new tools which are now being developed in the way of rapid machine searching should greatly help to correct this alleged anomaly. I am also aware of the argument by a minority of directors of research that they prefer their staffs to approach a new project with an open mind uncluttered by what has been attempted previously, as in this way they hope to get fresh ideas. This, however, is not the general view, since in most research establishments it is preferred to build on the foundations which have already been laid rather than lose the benefit of past work.

It has been rightly said that a large proportion of accumulated data does not advance the level of scientific knowledge because it exceeds man's capabilities of organizing and interpreting them; also that much scientific literature adds little to our useful knowledge because of redundancy. In these circumstances, it is highly desirable for the literature search to be discriminative rather than provide an indigestible mass of information. This naturally calls for the efforts of intelligent people co-operating in a well-planned system.

Function (*c*) demands initiative in keeping up-to-date with the company's projects and policy, besides of course ability to locate information about developments in its special fields.

Despite the increasing need for a greater number of efficient library staff, Dr I. A. Warheit said in 1957,[3] it is sometimes easier to convince management that it would pay to have a subject analyst, a key-punch operator, a coding clerk and a large monthly rental for some imposing machine for information retrieval, than to get a cataloguer and a few more trays in the card file. This is because of the peculiar fascination of gadgetry and because productivity and efficiency are associated in people's minds with machines.

INFORMATION OFFICERS

At this point, I should like to explain that my paper is written rather from the angle of the librarian, as many of the considerations affecting the latter do not necessarily apply to the information officer unless he is filling a dual role—and the tendency today is for separate individuals to handle the two functions. Opinions as to the desirability of information officers possessing library qualifications vary considerably, as will be realized from the following examples.

In 1951, E. R. Gilman[4] emphasized that the librarian must understand the subject matter with which he deals but that this may be done in either of two ways, namely:

1. The staff to be divided into two sections, one consisting of scientist staff for subject processing and service, and the other consisting of library staff for descriptive processing and service.
2. To use technically qualified staff with no library training to serve as subject specialist consultants for the library.

In 1954, J.E.L. Farradane,[5] writing on the technical librarian and the information officer, described the information officer as a research scientist specializing in information work and added that although he may sometimes be in charge of a small library, he does not need to be trained as a librarian.

Some of you may remember a paper by J. F. H. Wright and J. Tighe in 1954,[6] in the course of which Mr Wright took the view that there should be a person in charge who is midway between the research workers and the library staff, and who must have a scientific training and also training in the use of sources of information; whereas Miss Tighe took the opposite line, namely that an information officer should have a knowledge of advanced library techniques in the field of reference work, plus subject knowledge and, therefore, should be regarded as a specialist on the library staff.

According to an article in 1956 by R. C. Wright, on the Royal Aircraft Establishment,[7] technical information officers are not employed in routine library work but are considered as members of the scientific staff.

In 1957, Mr C. W. Cleverdon[8] described the qualifications desirable in a person controlling an information service as:

1. A basic knowledge of librarianship.
2. A thorough understanding of the main technical or scientific subjects with which the organization is concerned.
3. Ability in reading foreign languages.

He subsequently qualified item 1 by saying that the information officer must be very much more conversant with the library aspects of information work than is the ordinary scientist or engineer but that the library association examinations appeared to be too detailed for such people.

Mr K. W. Humphreys,[9] speaking at the Joint Annual Conference of the University and Research and the Reference, Special and Information Sections of the Library Association in 1960, suggested that a scientist or special languages expert, even though unqualified as a librarian, should be given equal consideration as regards remuneration with a professionally qualified librarian who has no other special ability. He also supported the view that it is unnecessary to have translators on the library staff either in universities or other research organizations and that the library should utilize a panel of translators instead. I would add that it is a very costly business to produce a translation and that full advantage should be taken of the existing possibilities of sharing in the cost of translation work.

In 1961, L. Cohan and K. Craven published a paper entitled 'Science information personnel: the new profession of information combining science, librarianship and foreign language' prepared for the United States Office of Education and the Modern Language Association of America.[10] These authors set very high standards for scientific information officers by stating that in addition to subject knowledge, they should have:

(*a*) professional library education and experience;
(*b*) administrative ability and experience;
(*c*) knowledge of traditional information systems and instrumentation;
(*d*) foreign languages;

as well as training in an information department.

They asked 207 organizations for their views as to the relative importance of the qualifications of a scientific information officer, with the result that scientific training was given the first priority, librarianship the second, languages and experience being a considerable way behind.

Also in 1961, Mr W. Ashworth of British Nylon Spinners Ltd,[11] reporting on the EPA (European Productivity Agency) Information Mission, said that on the Continent many of the directors of smaller firms spend a surprising amount of their time in handling information but that, even where there is nothing more than liaison with sources of information, efficiency increases. He states, however, that there soon comes a time when it is more efficient and less costly to appoint an information officer than to employ too much of the time of executives and technical staff; further, that contrary to popular belief, such an information officer will soon become familiar with the firm's needs and with available resources but that he must be given sufficiently high status to do his work.

I am afraid that time will not allow me to expand further on this theme of the information officer as distinct from the librarian, except to admit that in such cases where the librarian has to carry out all the functions of an information officer as well, then additional qualifications may well be desirable.

DUTIES OF LIBRARY STAFF

E. A. Wight[12] points out that being essential does not change the basic non-professional nature of many library duties, although he admits that clerical work itself should be graded according to its difficulty.

The whole subject is one which has received much attention over the years. Hence, following the principle adopted in our Research Department of making a literature review before any major investigation is put in hand, I have examined articles published during the past twenty years and have selected the following therefrom as having a definite bearing on the problem.

In 1941, E. V. Baldwin and W. E. Marcus[13] found that only 24.2 per cent of all library work was professional and that the percentage for individual libraries varied from 17.5 to 45.7 per cent.

In 1948, the American Library Association[14] prepared a descriptive list of professional and non-professional duties in libraries classified under thirteen main divisions, namely:

administration
personnel and management
self-development of staff
public relations
selection of material
acquisition of material
cataloguing and classification
mechanical preparation of material
registration and circulation
reference work
assistance to readers
physical up-keep of material
care of shelves and files

involving no fewer than 283 items, 129 of which were listed as non-professional. The number of duties is, however, no measure of the time taken in their performance.

In 1949, Watson O'D. Pierce[15] reported that 30½ per cent of the total man-hours in a library with three hundred staff were professional and that 29½ per cent was the proportion in a smaller library with only twelve staff.

In 1951, L. Jackson,[16] commenting on the staffing of a special library, stated that in many cases where the volume of work to be handled is small, it can be accomplished by one professionally trained person aided by a clerical assistant. The survey in 1946 of the libraries represented in the Science–Technology Division of the Special Libraries Association showed that a majority of the libraries which reported were administered by a staff of this size, although a significant proportion employed four or five persons—a librarian, assistant librarian, library assistants and clerical assistants—whilst a few had up to twenty full-time staff members (and over). In every situation, however, specific factors, such as the amount of routine work required, will influence the size of staff needed, and will decide what (of the total number) the proportion of professional personnel to clerical assistants should be.

In California, a committee of Californian librarians compiled a list in 1932 of professional and non-professional tasks in public libraries[12] because it was realized as extravagant to spend public money for professionals to do non-professional work, such as charging and discharging books, returning books to the shelves, sending out overdue notices, copying duplicate catalogue cards, counting and recording circulation, computing and collecting fines, receiving applications and issuing borrowers' cards, etc. In 1952, E. A. Wight[17] tabulated professional and non-professional hours for a staff of ten and showed a ratio of 6.5 : 3.1 of non-professional to professional hours of work.

The Detroit Edison Company were reported[18] in 1952 to have a central library staff of eleven, of which five had professional library training. Hence the proportion of unqualified to qualified librarians was 1.2 : 1.

S. Herner and M. K. Heatwole[19] published in 1952 the results of time studies to determine the quantity and type of staff required for a small research library known as the Library of the John Hopkins University Applied Physics Laboratory. Although the library studied employed two professional and two non-professional staff, the inquiry revealed a need for six full-time workers to serve four hundred technical staff. An analysis of the daily work load showed that 3.00 non-professional to 3.2 professional staff were required for the duties in question. The duties of the non-professional grades are stated to be as follows:

> Non-professional Clerical Grade 2. A stenographer, Clerical Grade 2, must have had not less than four years' experience in a recognized library or comparable institution.
>
> Senior Library Clerk 1 (Clerical Grade 2). Circulates publications of all kinds, files cards, maintains records, overdue notices, etc. Must have had not less than four years' library experience in Grade 1.
>
> Senior Library Clerk 2 (Clerical Grade 2). Maintains order on shelves, etc., accessions and processes, acquisitions, types request forms, assists the professional assistant in typing and filing catalogue cards, etc., occasional messenger duties. Not less than four years' library experience.

In 1955, M. O. Baker,[20] Librarian of Baker & Co. Inc., Newark, New Jersey, stated that one librarian and one clerical assistant were regarded as necessary in the United States to service thirty engineers, i.e. a ratio of 1 : 1 of non-professional to professional librarians.

In an article entitled 'A personnel formula' published in 1955,[21] it is stated that the 1947 American Library Association College and University Classification and Pay Plans specified a ratio of 1 : 1 of non-professional to professional staff, whilst three libraries believed to be giving good service, which were examined in 1955, had a ratio of 4 : 3. The latter ratio was considered at the time by all the head librarians to be inadequate.

In *College and Research Libraries,* A. I. McNeal[22] stated that the proper ratio should be at least 2 : 1, whilst another writer, M. J. Voigt,[23] asserted that thirty-two university libraries already had staff ratios up to the level recommended by McNeal. The same article lists a number of duties additional to those in the ALA list. The article concludes with the recommended formula of 75 per cent clerks to 25 per cent librarians.

In the Aslib *Handbook of special librarianship and information work* originally published in 1955,[24] there is an interesting discussion of the qualifications of different categories of library staff, Table 1 in particular giving a breakdown of types of work alongside the type of person needed and the possible training and qualifications.

In 1956, M. O. Baker,[25] writing in *The Iron Age,* made the statement that one librarian together with one clerical assistant cannot generally service more than twenty research workers. This statement, although not written for the purpose, does show a ratio of 1 : 1 for non-professional to professional library staff.

In December 1956, a report on the library service of the Royal Aircraft Establishment in this country was published[26] showing that in addition to the chief librarian, one librarian III and two librarians IV (= four professionally trained librarians), there were four clerical officers, nine clerical assistants, two typists and two record-storemen (= seventeen non-professional staff, excluding a full-time messenger); hence a ratio of non-professional to professional staff of 4¼ : 1.

In January 1957, Miss J. Binns of the English Electric Co. Ltd[27] published a paper entitled 'Guide to equipping and staffing of industrial technical libraries' in which she gave a specification of duties for a library staff of seven, three being professionally trained librarians and four being non-professional, i.e. a ratio of unqualified to qualified of 4 : 3. The non-professional staff were to have the following duties:

> Issue of loans; overdues; responsibility for stationery, binding, etc.; typing of correspondence, library publications, bulletins, book lists, bibliographies, requests for loans, orders, etc., index cards and catalogue cards; periodical circulation; duplication and stapling of publications; parcels; messages.

In the 1959 Staff Manual of Stanford University Libraries[28] it is laid down that professional library staff should be augmented by an efficient non-professional staff. Four grades of service not requiring professional education or specialized training in librarianship are described, namely:

> Library Assistants. The beginning grade. These include typists and others doing work of a comparatively simple clerical nature.

Senior Library Assistants. Their work entails some experience and possibly some supervisory aspects or processes of some difficulty.

Principal Library Assistants. Have important responsibilities or difficult work which, however, does not require professional training. A college degree is often required for this category.

First Library Assistant. For staff with long experience and specific responsibility for special sections such as the inter-library loan service, the reserve book room, etc. A college degree is usually required.

In 1959, Kathleen B. Stebbins in an article entitled 'The forward look in recruitment and library education'[29] made several positive recommendations which are worth recording:

> Re-assign duties so that routine clerical aspects need not be done by professional librarians.
>
> Analyse all jobs carried out in the library, particularly asking questions such as: Is this necessary? What purpose does it serve? Is it duplication? Is there a more efficient way?
>
> Make the best out of the people you employ.

In a so-called 'Personnel survey 1959' by the Special Libraries Association of America,[30] data received from a large group of special libraries excluding college, university, public and government libraries and covering 1,137 special libraries with 2,311 professional librarians in their employ, showed that the average number of professional librarians per library varied from 1.8 to 2.1 (say two librarians per library). When sub-divided according to type of business or organization, the average number of professional librarians per library varied from 1.2 to 5.1, the lowest being in architecture and engineering and the highest in nuclear and atomic energy. The average number of all library staff per library varied from 2.3 to 18.3 with the general average of 4.7, the lowest and highest being again in the same categories as for the professionally trained librarians. The average number of unqualified librarians per library was from 1.1 to 13.2 according to the industry served. As a matter of interest, chemical organizations head the list with 122 out of 579 scientific and technical libraries, electronic and electrical equipment manufacturers being next with ninety-three. Of the remaining libraries, 143 are general reference libraries and thirteen are fine and applied arts. Analysis of the data shows that there are 2,603 non-professional to 2,238 professional librarians in the survey, or a ratio of 1.16 : 1 for the 1,137 special libraries in question. The total average staff in the latter was 4.25, whilst the professionally trained staff averaged 1.97 per library with 2.28 for non-professional staff.

There were 232 one-man libraries out of the grand total of 1,137, or approximately 20 per cent. This compares with 13½ per cent in the Aslib *Survey of Information/Library Units* mentioned below. There were 483 other libraries with only one qualified librarian, representing 63 per cent of all the libraries mentioned. The report contains an interesting table giving the average percentage of time spent by qualified librarians on certain types of duties. Administration and supervision are shown as 16 per cent; reference as 16 per cent; cataloguing as 10 per cent; literature searching as 8 per cent; acquisition, classification, indexing, each as 6 per cent; planning, policies and procedures as 5 per cent; abstracting, research, circulation and filing each as 4 per cent.

There is a certain amount of justification for the feeling that insufficient use tends to be made of non-professional library staff. In the British Iron and Steel Research Association report DIS/44/60[31] on practical experience with the ASM/SLA metallurgical literature classification, it is stated that staff with very little technical knowledge can be trained to use it. This implies that professional training is not a vital necessity if this particular classification is used. I am not surprised at this because it is a ready-made system which does not call for any particular personal knowledge or skill beyond common sense in its use.

In 1960, Aslib published a report on a *Survey of Information/Library Units in Industrial and Commercial Organizations.*[32] A sample of fifty-two out of a list of 444 libraries was selected, representing about 12 per cent of the population surveyed. Eleven (21 per cent) came from the engineering industry, seven (13 per cent) from the chemical industry, and five (9.6 per cent) from the metals industry. These were the three highest. Twenty of the fifty-two libraries were from the London and south-eastern region. As mentioned earlier in this paper, four of the fifty-two libraries were one-man libraries, representing 13½ per cent, which is slightly lower than the 20 per cent found in special libraries in the United States and Canada. Staff details of these organizations show the position to be as follows according to an analysis made of the original data:

Category of staff	*Heads*	*Remaining staff*	*Total*
Library qualifications (F.L.A. or A.L.A.)	11	19	30
Sub-A.L.A. (passed some parts of LA Registration examination)	2	14	16
Degree qualification only or equivalent	22	49	71
Neither library nor degree qualifications	17	164	181
TOTAL	52	246	298

If one does not consider sub-A.L.A. as a qualification, then the ratio of unqualified staff to professionally qualified librarians and/or degree holders is 1.95 : 1; whilst if two sub-A.L.A. staff are considered equivalent to one qualified and one unqualified staff, the ratio becomes 1.73 : 1. On the other hand, if one considers library qualifications only as professional qualifications, then the ratio becomes 8.9 : 1, or 6.84 : 1 if sub-A.L.A. are considered as 50 per cent professionally qualified.

In 1961, the American Library Association's Descriptive List was used in the compilation of a randomly arranged list of one hundred library duties equally divided between professional and non-professional, and sent to professional staff members in twenty public libraries in the Los Angeles area. Reporting the results, E. D. Hart and W. J. Griffith[33] estimated that branch librarians and departmental heads spent 100–180 minutes per day on non-professional duties whilst lower-ranking professional librarians spent between eighty and 160 minutes daily on such duties. This was alleged to be due to unawareness of the problem, general indifference to the practice, and staff shortages.

At the 1961 Annual Conference of the University of Chicago Graduate Library School,[34] it was stated that librarianship involved mainly routine and orderly behaviour. This implies that a very considerable portion of library duties can be taught to non-professional staff.

W. J. Goode,[35] at the same Conference, asserted that two-thirds of library work was non-professional in character and that neither the public nor many other libraries are convinced that the non-professional with experience cannot do the job of the professional; further, that much of the work of a librarian is administrative, which is not specific to librarianship.

The Library Association in this country has just published a *Descriptive list of professional and non-professional duties in libraries*,[36] sub-divided under twelve main divisions on a functional basis, i.e. grouping together all duties connected with the circulation of material or with assistance to readers. They represent a total of 322 items of which 101 items are described as non-professional duties. Here again, however, the number of items in each category is no criterion of the time taken in their performance. Perusal of this list reveals that it is based on public library practice and that quite a substantial proportion of the duties described are not encountered in many special libraries.

The Library Association hopes, however, that this list will be useful as a basis for a job analysis to disclose overlapping functions or uneconomical use of professional time.

It is emphasized that it would be misleading to say that specific techniques classified as professional cannot be taught to individuals who are not, by training, professional librarians.

Table 1 summarizes data received in reply to a questionnaire which I circulated to all the libraries mentioned in J. Burkett's recent book on *Special library and information services in the United Kingdom*. A considerable proportion of the replies indicated that library services were not necessarily separate units and therefore precluded participation in the inquiry. In other cases, the organizations concerned preferred university graduates without normal training in librarianship, whilst a third category of replies was to the effect that the set-up was too small for consideration. However, details were obtained from thirty-four special libraries, employing in all

1. 55 professionally qualified librarians
2. 103 unqualified librarians (some of whom are, however, studying librarianship)

whilst not included in the foregoing figures are:

3. 41 information officers (graduates)
4. 11 unqualified information officers
5. 19 translators
6. 15 abstractors
7. 64 typists.

If one considers categories 1 and 2 only, then the ratio of unqualified to qualified librarians is 1.87 : 1. If two sub-A.L.A. staff are regarded as equivalent to one professional and one unqualified librarian, then the ratio of 1.87 : 1 becomes 1.61 : 1. If one considers categories 1, 2 and 7, then the ratio becomes 3 : 1.

TABLE I

COMPARISON OF PROFESSIONALLY QUALIFIED VERSUS UNQUALIFIED STAFFS

In some cases, some of the librarians are also linguists but I hesitate to attempt any conclusions regarding categories 3 to 7 except to point out that there are forty-one graduates compared with the forty-five non-graduate information officers, translators and abstractors. If all the staff in categories 3 to 7 are considered as unqualified librarians, then the ratio of unqualified to qualified librarians becomes 4.60 : 1. On the other hand, if the graduate information officers are considered as equal to professional librarians, then the ratio becomes 2.21 : 1.

In 1956, at a time when pressure was being brought to bear in support of a request for an increase of staff, we carried out an exercise in my library on the duties of the library staff of four (ignoring for this purpose the staff of five in the information section). At that time, our qualified librarian-in-charge was personally undertaking the following duties:

General supervision
Sorting of mail
Dictating letters
Telephone
Literature searches
Checking new book lists
Book ordering
Getting books on approval and seeking specialist opinions
Subscription renewals
Overdue reminders
Classification of incoming literature
Filing and checking of catalogue cards of books and pamphlets
Checking of translation catalogue cards
Examining Brutcher lists of new translations
Checking BISRA report lists
Physical checking of books on permanent loan
Issuing books and pamphlets.

This meant that all the remaining duties in the library were carried out by unqualified staff who were in the ratio of 3 : 1. The appeal for an additional member of staff was partly to enable our qualified librarian to shed the duties italicized above and also to enable the following additional duties to be taken up by her:

Retyping of catalogue cards
Correcting of anomalies and splitting up some of the older omnibus cards into separate sections
Revision of subject headings
Binding (selection and preparing for dispatch)
Periodical revision of condition of stock

whilst it was also intended that the unqualified staff should undertake not only the six duties mentioned above as having been formerly the task of the qualified librarian but also additional tasks such as reboxing and relabelling of pamphlet material after reclassification, the compilation of a numerical card index for all patents, etc.

During the preparation of the present paper, I asked our librarian to examine how far we were following the division of professional and non-professional duties recommended in the Library Association's *Descriptive List* mentioned earlier (p. 369 above). I suggested that if we were to estimate the total time spent on the ninety-five items classified as non-professional duties, then, by deduction from the total man-hours in the library, we could form an idea of the proportion of non-professional duties out of this total. It was quickly realized, however, that the Library Association list of non-professional duties is primarily applicable to public libraries with separate administration, book ordering, lending, cataloguing and reference departments, in that only thirty-nine of these items apply at all in our case.

Our librarian has defined the functions of a special librarian as primarily to assist readers to extract information from literature and also other sources of unpublished information. This calls for a knowledge of the literature of the subject rather than the subject itself and all methods of organizing and administering the literature so as to make the maximum use of its contents when dealing with a definite inquiry or in advising browsers. On the other hand, reading, digesting, abstracting, translating and evaluating information is more the function of an information scientist as in our own case, although it must be admitted that many librarians, whether professionally qualified or not, are expected to fulfil both functions to some extent. In any event, staff of a certain calibre are essential for such dynamic duties and it is a moot point whether they could be attracted to the information field unless their conditions of pay were equal to those of the professionally trained librarian.

As a practical example of the time our library staff spend on important inquiries which involve fairly considerable searching of the literature, I may say that so far this year we have received, on the average, approximately one hundred such inquiries per month. We also produce bibliographies from time to time which again involve a considerable amount of time.

It has been pointed out to me also that the amount of work for non-professionals may vary very considerably according to the library methods followed. For instance, we have long circulation lists for our periodicals and insist on each reader returning them to the library before reissue to the next reader. If these periodicals were merely displayed in the library instead, it is estimated that we could dispense with one and a half non-professional staff (and about four and a half hours of typists' time on overdue notices per week). If we did not get books on approval and if we did not maintain borrowers' cards or stick 'due date' labels on all issues of loans, we could probably dispense with the services of, say, half to three-quarters of the time of a non-professional member of staff, although the same number of professional staff would still be needed.

Our librarian also feels that in a busy special library with the minimum of staff (which is usually the case), the professionally qualified librarian cannot spare sufficient time for the adequate training of new unqualified staff and that in consequence new staff ought really to have general background training beforehand in the basic principles of librarianship. If this were the case, it would be logical to expect them to want to qualify in due course. It would be interesting to learn whether this is the general view or whether it is possible to retain for a reasonable time intelligent unqualified library staff to carry out much of the routine work.

SUMMARY

(*a*) *One-man libraries*. In the case of one-man libraries there are so many problems which demand the knowledge and experience of a fully qualified librarian that the organization concerned will find it essential to employ a fully trained person for efficiency. If this is done at the outset it may cost more to begin with but it will pay in the long run. If, however, it proves impossible to obtain permission to engage trained staff, then avoid at all costs the misfit who had not worked very well in another department. As Miss R. Nielander recommends in her paper *Dollars and sense of a company library*,[38] if you cannot afford a trained librarian at first, select a bright girl with lots of enthusiasm who gets along well with people and has an inquiring mind.

(*b*) *Larger libraries*. As the staff grows, however, there is no reason why a larger proportion of the routine duties should not be allocated to unqualified staff of suitable calibre. The exact ratio will, of course, depend on the number of specialized services supplied by the library and/or information department and on the major subject interest. For instance, twenty out of the thirty-four special libraries listed in Table 1 (p. 370–1) prepare abstract bulletins and this, of course, is a service demanding considerable time and skill.

S. Möhlenbrock, Director of Public Libraries, Gothenberg, published a paper early this year[39] in which he states as his experience that even such tasks which hitherto have been reserved for the professionally trained librarian could sometimes be taken over with good results by clerical staff duly trained for their new tasks. This applies, for instance, to parts of the classification and cataloguing routines in public libraries. The chief point is that it should not be taken for granted that a routine is best done in the way it has always been carried out.

D. A. Kemp of Edinburgh made the following pertinent observation recently[40]: 'I know far too many competent and helpful "unqualified" librarians not to want to point out that A.L.A. or F.L.A. after a person's name does not necessarily imply that he is more qualified to run a specific library than a person without it.' He added that much of the knowledge required in special library work will not be gained from studies in compliance with the LA syllabus. In another publication[41] the same writer asserted that the administrative process of a library could well be undertaken by non-professional staff provided that they are of reasonable intelligence and general education.

(*c*) *Streamlining or shortcuts*. It might perhaps be useful to emphasize here that streamlining of library routines can often pay dividends. Among suggestions which have been published in the past are the following.

(*i*) J. L. Wheeler[42] gives examples of library studies to simplify work and claims that the meagreness of experimentation is due to wide personal disinterest and unawareness that anything could and should be done.

(*ii*) Bella E. Shachtman[43] describes a process form designed by the US

Department of Agriculture Library to ensure that all information located about a publication is available for all the following steps in processing that publication, and to avoid duplication of effort in searching and handling. The form covers routing, selection, searching, cataloguing and processing information. It helps to keep professional assistants doing completely professional work and gives concise, clear instructions to sub-professional and clerical staff.

(*iii*) R. Blasingame[44] believes in work simplification by motion and time study, process analysis, workplace layout, and methods study to save the time of staff for the more constructive work of librarianship, assistance to readers.

(*iv*) A. P. Sweet[45] pleads for standardization in the use of forms and form letters in order to reduce the amount of work to be done in an order department.

(*v*) R. H. Logsdon[46] discusses time and motion studies in libraries, in particular those carried out by the New York Public Library as part of the Public Library Inquiry and as the photo-clerk experiment.

(*vi*) C. D. Johnson[47] describes the production of catalogue cards on multilith offset printing machines.

(*vii*) R. A. Elftmann[48] suggests some simplified procedures in the handling of serials in a small library.

(*viii*) Geraldine D. Anderson,[49] Librarian of the Research and Development Division of the Pittsburgh Consolidation Coal Company Library, Pennsylvania, gives a number of hints on continuations, photostats and microfilms, interlibrary loans, technical journals, accounts, listing of serials.

(*ix*) Marie G. Wright and R. C. Gremling[50] of the Bell Telephone Laboratories indicate a method whereby index cards can be used for the technical bulletin and afterwards serve as a permanent index to periodical material, thus saving 50 per cent of the previous typing effort.

(*x*) C. W. Hanson and C. E. C. Hewetson[51] surveyed the journal circulation practice and finally recommended, as the ideal system, scanning by the library staff and the circulation of an abstract bulletin plus selective circulation of the journals, provided that the librarian is not over-burdened with routine duties.

(*xi*) R. C. Swank,[52] Director of the Stanford University Libraries, California, suggests that the present order procedures might usefully be analysed and compared and/or combined with the more conventional multiple form procedures; that simpler and more efficient binding procedures should be adopted; that cataloguing with Library of Congress cards and preliminary cataloguing should be assigned largely to non-professionals and that the development of a more stable career service among non-professionals should be encouraged by increase of non-professional salaries.

(*xii*) S. A. Tasker[53] of the Organization and Methods Department, Unilever Limited, lists a number of ideas for streamlining work of records.

(*xiii*) D. J. Flitcroft of the Manchester College of Science & Technology[54] has published a report on a self-service photocopying experiment in the Library of the Manchester College of Science & Technology, and summarizes the advantages and disadvantages.

(*d*) *Reading by librarians during working hours.* R. H. Muller[55] considers that professional librarians should be well-read in the particular subject in which their libraries specialize. He suggests that they should, therefore, be allowed to use a certain amount of their working hours for cultural and professional reading and gives examples of libraries which have officially sanctioned this policy. Obviously, such a course would be greatly facilitated the more the librarian is released from routine duties by the training of non-professional staffs to take over such functions.

(*e*) *Training of non-professional librarians.* It may be of interest to note that the American Library Association, aided by a grant of $60,040 from the Council on Library Resources Inc.,[56] began in 1960 the preparation of a series of pamphlets which will constitute a general manual of small library practice and in particular will provide guides for librarians without professional training.

(*f*) *Information searching.* Being particularly concerned with metallurgical research and development, I am naturally familiar with the American Society of Metals (ASM) service. Their advertisement reads 'Are you reading more now and remembering less?' This is very well expressed. Their mechanized information retrieval service is now available to notify subscribers on a current basis of everything that is being published anywhere in the world. Surely this is better than trying to scan an inordinate number of periodicals and reports in order to locate those articles and discussions which really interest one. Similar facilities doubtless exist in other industries and the librarian wishing to keep up-to-date with the minimum of effort would be well advised to seek full details if he does not already possess them.

(*g*) *Actual ratio of unqualified to qualified staff.* The various published references quoted earlier in this paper show the ratio in individual organizations to vary between 1 : 1 and 8.9 : 1 with the bulk between 1 : 1 and 2 : 1.

The replies from thirty-four special libraries to my 1962 questionnaire showed the ratio of 3 : 1 for purely library and clerical staff, this being reduced to 2.2 : 1 if grouped with information officers, translators and abstractors, and considering graduate information officers to be of equal status to librarians.

In my own library, the ratio of unqualified to qualified library staff in 1956 was 3 : 1, whereas today it has altered to 2 : 1 if two sub-A.L.A. staff are considered as equivalent to one qualified and one unqualified librarian. By modifying the duties mentioned earlier (p. 373 above), the latter ratio might possibly be reduced to 1 : 1. If we did not have our present access to the services of other, existing, departments such as photography, accounts, wages, etc., the extra staff thus required by our library would tend to increase the above ratios.

CONCLUSION

My personal belief is that we have not yet reached the limit of the duties for which unqualified staff of a suitable calibre can be trained by in-service training and/or by study. The larger the library, the greater the ratio of unqualified to qualified staff might safely be made in many cases, although no universal rules can be laid down in view of the diversity of practice in different libraries.

Even if the library has no separate information department and is expected to fill the dynamic role of keeping scientific and technical staff up-to-date by means of information sheets, abstracts, translations, bulletins, etc., I am not convinced that this would necessarily call for additional professionally qualified librarians. On the other hand, it may be that staff with special ability or knowledge needed for certain types of duties, although not professional librarians, may well be equally as expensive.

In the light of what I have said, you will realize that it is almost impossible to define precisely what is the desirable ratio of non-professional to professional library staff in a special library. My examination of the position in the libraries mentioned in this paper shows the ratio to vary between 1 : 1 and 8.9 : 1. As a basis for discussion, however, I would suggest that in a progressive, well run, ✓ special library, where the organization has no separate information department but where the library has to carry out the dynamic duties described above and in consequence would have to employ subject specialists, university degree holders, or qualified translators, the desirable minimum ratio should be 2 : 1. Even where the organization has a separate information department but where the library has to carry out services such as information searches, the compilation of bibliographies, etc., the desirable ratio would not necessarily alter in that graduate information officers considered as equivalent to professionally trained librarians would require servicing by clerical staff to at least an equal extent.

On the other hand, in libraries which are not normally required to carry out information searches, compile bibliographies, or provide an information service, this desirable ratio of unqualified to qualified librarians might well be increased to a minimum of 3 : 1.

To be more precise than this would involve a careful listing of all the duties carried out by the library staff in question and consideration as to how far professionally qualified staff could be released for more important duties by training unqualified staff of suitable calibre.

May I finally point out that these recommendations are intended to apply to special libraries, since the routine duties in a public library, being so much more numerous than in a special library, would probably justify a far bigger ratio of unqualified to qualified staff.

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AN OUTSIDER INSIDE INFORMATION: USA 1961–1962

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ABOUT two years ago I got an invitation to spend some time with the Center for Communication and Documentation Research, which is a part of the School of Library Science in the Western Reserve University at Cleveland, Ohio. I was very pleased about this, not only because I happened to know the people personally but also because it was a place which had been getting on with its job, yet quite prepared to change what it was doing, for a considerable time. So by going there I would find out what really were the real difficulties in this line of work, particularly in what I consider to be the fundamentals of information. This is better than thinking it up in an armchair. We are still at the alchemical stage of this business, and the first thing one can do is to find out what is really happening, rather than build an enormous mathematical edifice on nothing at all—rather like a large elephant balancing on a small ball-bearing—which is not unknown in computing circles.

I am grateful not only to the Center for asking me but also to the US Air Force Office of Scientific Research and Development, Information Sciences Division, which financed the visit. Also, I should like to express my thanks to the Royal Aircraft Establishment and to the Ministry of Aviation for making things very easy for me to go. Naturally most of my duties were in Cleveland, in the University, but it seems rather foolish to go some four thousand miles west of one's own home without making the most of it. So, during my visit I attended nine major conferences, thirteen seminars, talks and so on, of a more or less formal nature, and visited about seventeen institutions, firms, and universities to see what they were up to; as well as meeting many people in many different activities.

Of the seventeen or so organizations I went to I shall first mention General Motors Research Laboratories at Warren, in Michigan: not only because I was given a ride to the airport in a 1962 Cadillac, not only because that particular place is geared entirely for telephone inquiries from all over the States, and indeed from Europe too, but also because I had the great pleasure there of meeting our old friend Eugene Jackson. He is now very happily employed there.

The Systems Development Corporation, in Santa Monica, is quite a typical American organization. It is voluntarily a non-profit organization; in fact an offshoot of Rand which has outgrown its parents. It has, I suppose, as much computing hardware as the whole of the United Kingdom, and if you draw a five-mile radius round it I should imagine you would find about four times as much hardware for computing as in the United Kingdom. The number of computers in the USA is enormous. In fact, some of the high schools have IBM 650's, though I do not want to give the impression that all American high schools have IBM 650's. Far too many of them are worse equipped than our own high schools. Systems Development Corporation itself employs one thousand programmers. Their average age is about twenty-four, they are paid up to $10,000 a year, and all these people can program IBM 7090's in their sleep; they wouldn't be employed unless they could. As a matter of interest, this Corporation, which is much concerned with the interchange between people and systems, as an experiment trained some children between eight years old and eleven years old to program 704's quite successfully—and why not? The effort was in fact to find out where programming ability lay. We don't quite know. A minor point there is that Polaroid cameras (the ten-second cameras) are normal fittings on most computers over there to photograph the output and oscilloscope records.

The National Institute of Health is a colossal complex. The amount of work on documentation of all forms and librarianship in all forms, including the traditional, that goes into what are called the life sciences is almost incredible. Nevertheless, one finds little things under flat stones even in the National Institute of Health. For example people trying to push Peek-a-boo systems far further than they can be useful. But at the same time one finds people using Honeywell 800's and expensive printing and publication devices extremely well. Although I do not think that the Thalidomide doubts were due to the good documentation system which does exist about drugs in the States, it is quite obvious that this is a field in which the more mechanized forms of documentation can help a great deal. For here a very strict form of query is put to the system; that is, what treatment? what condition? and what results? When you have highly standardized queries of that sort of course the various freak methods and mechanical methods are liable to be more successful than in some other fields. Also, chemistry is—relatively speaking—highly disciplined in its terminology compared with some other activities. Actually it is rather unfortunate that most non-conventional documentation on a big scale originated in the field of chemistry. People have got the idea that other activities can be so highly structured and highly systematized as chemistry can be. They are wrong.

Of interest to the present audience are the activities that have been going on in ASTIA—Armed Services Technical Information Agency—because we, as NATO members, get most of our information about North American reports from ASTIA, or with ASTIA markings on, and we have to conform. They overhauled their system some four years ago with considerable success. They are now revising this work, and in the course of doing so they held monthly meetings in Arlington. Virtually these were adult education classes, because people got there who were interested in documentation, and argued things out in informal discussion. I myself found that I had been lured on to a terminology committee for part of the time. This is a very necessary committee; particularly as certain people deliberately use things like 'terms', 'descriptors', 'subject headings' and so on, to mean the same or different things, without defining them. Some do it on purpose, to prevent people getting too theoretical and hifalutin. Just as, about 160 years ago, people thought it was theoretical and hifalutin to distinguish between momentum and kinetic energy. Subsequent events proved that there is quite a little difference. So also for documentary terms. Terminology at least will be one of the things which will be improved by ASTIA.

Now for some of the conferences. I was at the Gordon Research Conference on Scientific Information Problems in New Hampshire in July 1961. These are conferences which do not have formal printed proceedings. They are meant to be inter-disciplinary; getting together people who work in various fields, on subjects which concern all of them. The difficulty we found was the old one of language; everybody used words in different senses, since some of them were computer folk, others administrative, a lot from federal agencies, and some were medical, and so forth. But it did some good, if only to bring out this difficulty.

The Association for Computing Machinery Meeting in Los Angeles in September, in a temperature of 102°F, suffered, as so many computer conferences do, from computing engineers who pick up old books on the physiology of the brain, in secondhand bookstalls apparently, and then build large computer programs on them. Many of the psychologists and physiologists I happened to be with at the time were getting uneasy after a day or two of this sort of thing, and got quite rude about it.

Amongst the worthy and relevant contributions was that of Hamming from Bell Laboratories. He spoke of 'information generation', as an alternative to information retrieval, and although I think he was on the wrong track in one sense he was on the right road in another. However that may be, he raised important issues. There was also a discussion run by the Special Interest Group on Information Retrieval. Here it seemed to me that a lot of the old computing fallacies were dropping out, and people were getting down to some understanding of what it was really about. But the Association for Computing Machinery is still a little handicapped by having originated from mathematical machinery in its stricter sense.

There was an international meeting of Patent Offices, on information retrieval, at the State Department in Washington in October, to which I was invited. This extremely interesting and important meeting brought together people from Patent Offices all over the world—Japan, Holland, Germany, the United Kingdom, Australia, and of course the United States. One slightly disturbing feature was that although many of the offices had done interesting work, none knew what the others had been doing. One would have thought in the Patent Offices, which necessarily have to have some communication with each other, things should have been better; and some remarks were made to that effect. It was a good meeting and the standards were high. The United States Patent Office is a pioneer of mechanization in this very difficult and complicated field, in co-operation with the National Bureau of Standards. Both took an active part in the meeting.

The American Documentation Institute had its annual meeting in Boston in November. This was an important one because three whole sessions were held on the state of the art of documentation. I was acting, some of you may be surprised to know, as a Moderator (the term is a purely technical one) in the meeting on advanced mathematical methods in the field. I was dreading this. I have a somewhat brittle temper at the best of times, and quite a considerable amount of rubbish and unnecessary effort is spent in the wrong direction in the field. Actually it was a pleasant and informal meeting. The people there were all mathematicians, so they didn't have to do any mathematics just to prove they were mathematicians, which was a great help. They were all trying to find out where they could apply mathematics before they tried to apply it. This is not always done. They were also extremely modest in their claims of what could be done, especially those who knew the most about it. The session, which was, as I have said, informal, probably did a great deal of good.

Now you will have noticed that amongst the institutions I have not made much mention of universities or library schools. The connection between the Schools of Library Science and the study of mechanization of documentation and information retrieval work, mechanized or not, is not very strong. The Western Reserve University is rather exceptional in this way, because the Dean of the School of Library Science is extremely keen on these matters. But there is still not quite the complete co-operation that I should like to see, not only there but particularly over here. It is a sad business, division between the so-called traditional library methods and the less conventional library methods. It is not a proper division at all, and it is doing a great deal of harm.

The applications of mechanization, of course, are very wide. One interesting example was shown by FASEB, the Federation of American Societies of Experimental Biology, in actually planning their Society's conference in 1960, and printing it out with indexes, entirely by machine. The authors of papers indicated what kind of sessions they would like to go to, and the results were fed into a computer which tried to arrange for the minimum clashing of sessions, and, indeed, made its own subject headings for the sessions; and the whole thing was afterwards printed up into an enormous book, with keyword-in-context index. Abstracts of papers were restricted to a certain page area, and the whole thing was photographed and then reproduced in facsimile. The result looked rather like a type specimen book, but at least it was readable.

There is a certain amount of mechanization of legal work going on. But chemistry still leads in the amount and variety of applied documentation, with the possible exception of military applications.

Let us consider some of the more reasonable forms of mechanization. First, the activity of making marks. One of our biggest troubles is that, whilst many machines will make marks, they do not make them very legibly. A good deal of work is now going back into microforms. This was quite the coming thing a decade and a half or two decades ago, but it got neglected. At that time a 20:1 or 30:1 ratio of reduction was just about as much as you could hope for unless you used laboratory methods. Nowadays you can get a 200:1 reduction, even with automatic handling, by microfilming microfilms. This literally alters the shape of things, so the next problem is to find some method of reading books without opening all the pages. Of course the card index does that to some extent; the difficulty is to provide micro-manipulation of microforms. A general line of attack is to shoot out little slips of microfilm from air-lubricated slots in a huge block, so that you are really storing stuff in volume instead of surface. The rapid selector, first visualized in 1930, has had its ups and downs since. It stores microfilm on a reel and copies are taken off by picking up index marks photo-electrically. It has been resuscitated by Tom Bagg of the National Bureau of Standards. He has the sense to use it sensibly instead of for things that obviously won't work, which is one of the reasons it has been dropped before. For instance, he doesn't try to make enlargements with it, he makes microfilm copies of microfilm. If you make enlargements you've got to take a huge sheet of paper and take it out again before you can go on. This means that the machine is extremely fast only when it isn't selecting anything.

High-speed printing is a major use of mechanization, in the sense that indexes and so forth, however prepared, can be printed at enormous speed. They are not printed very legibly, and I should say that the limit of impact printing has probably been reached. As it is you have to use very light type with no serifs. When this has been reduced photographically by two-thirds it is virtually illegible. The practice of using upper case, for some reason I've never been able to understand, instead of the more legible lower case, again doesn't help things. Where high speed is not called for, you can turn to the various systems such as Listomatic where you use the Varityper or another device, typing one line at a time, using several founts and chemical and other symbols, on the edge of a punched card. You then marshal and edit the cards mechanically, and photograph the resulting page. These are in very wide use, for instance, in *Chemical Abstracts*.

If now we consider symbol manipulation as well as just making marks, the main trend, both theoretically and practically, is not to do the documentation work for the person concerned but to make documentary tools for him to do it himself. For instance, keyword-in-context indexes spring up all over the place. They leave a man to do his own thinking but present to him very quickly, in a fairly useful form, what has been produced, in one month, say, in a certain field. These things have their perils. I found at the Armour Research Foundation (where for the first time I gave a talk on top of a nuclear reactor) that they were starting a keyword-in-context index for mathematics and physics. As a guide they used the list of significant words—or more exactly, of non-significant words—compiled by *Chemical Abstracts*. As you probably know, a significant word for a keyword-in-context index is a word that has not been explicitly listed beforehand as non-significant. This of course is to admit new words, otherwise you would close the system to changes in vocabulary. Words like 'analysis' and 'system' are non-significant in a chemical context. If you used them you would bring in half the publications in chemistry before you knew where you were. But they are not non-significant in mathematics. 'Analysis' does not mean in mathematics just what analysis means to any ordinary person. Most normal words used in mathematics do not mean what they mean to other people—indeed, they do not generally mean the same to other mathematicians either; and this sort of thing can cause trouble.

Again, as important examples of symbol manipulation and printing, we have the tape-typewriters. Everyone agrees that the use of a keyboard which produces more than one kind of mark—machine-readable together with human-readable, for instance—is essential, and we are going to save ourselves a lot of trouble in the future if we start making records that way now. But how best to do it is another matter. There are a lot of subtle snags. A less subtle example is that of people whose surnames have meaning in ordinary language as well as being proper names. For instance, a man called 'Blackbottom' can cause a great deal of trouble here as well as in automatic translation. Nevertheless many plans are being made for using these devices. The general complaint is that they do not do nearly as much as they ought to, and they cost far too much. And that is certainly true. But the use of the tape-typewriter and mark-manipulating devices is potentially very powerful. For instance, there are extensions of the desk computer (of which I saw a good many specimens) which are made to individual requirements. They are desk calculators, in the sense that the man who is doing the job communes with the device. The computer part itself is really only as big as a desk calculator, but the rest is like several large filing cabinets, consisting of tape units, read-in/read-out units, and typewriters, and has the great merit that a man can talk to the machine as he goes along by writing with a photo-electric pencil on a cathode ray-screen. I have seen a man build up a circuit diagram complete with all conventional symbols just by indicating where they should go in. Instructions for the next step appear on the screen after he erases mistakes, and it finishes with a perforated tape. When this is played through it can display the corrected image or reproduce it on a plotting device. The saving in time is about 10,000 to 1 in producing engineering drawings; and you can do the same with the typewriter—you type the corrections under your sheet and the machine will make the corrections for you.

There are many special machines for finding Boolean functions of marks or words, recorded on magnetic tape. Whether these special machines are useful in documentation I very much doubt. They probably will be useful in the future for people who make computer programs.

Devices and theories for recognition, self-organization, system simulation, and the rest, undoubtedly are somehow related to our field. I was at the West Coast for a week to deal with some computer simulation of a social situation. However, the present audience is unlikely to be much interested in this.

Searching, as such, is a minor task, although somehow or other beginners always think it is the most important. A major task is, of course, organization of the storage. Here a great deal of work has been done by the computer people; real progress has been made on the organization of files—not necessarily with computers. The enormous files, for instance, of the Californian land records are on punched cards because you could not get them all into a machine. However I must warn that a certain computer firm has solved the information retrieval problem in the way that so many people do, by applying the name 'information retrieval' to something quite different; that is, to hardware for file organization.

Distinct from mark-making and mark-manipulation is mark assignment. All of us here are concerned with this. Much is going on in linguistics. Unfortunately it is mainly on verbal linguistics. The state of the art of information retrieval would be much healthier if people would realize that documents are not necessarily in what we call ordinary language. For instance, they are often diagrams or pictures. Russ Kirsch, in the Bureau of Standards, has constructed a mathematical synthesis of what he calls a fragment of English, which can be applied to certain of the simpler forms of circuit diagrams also. More can be done that way. Work on vocabulary is enormous. Only within the last few years has it been possible to find out what words people use and how often they use them. Even then it is very expensive.

Much work is being done also on auto-quotation; more commonly, and more horribly, called 'auto-abstracts'. Auto-quotation means applying various statistical rules to select sentences from an article so as to give coherent quotation from it. Put in that form it is a sensible task. If one calls it an 'auto-abstract' it is not a sensible task at all. For instance, one gets led into all kinds of irrelevant arguments as to what an abstract is. It is not an abstracting, it is a quoting system. One thing is very clear in all this, that both in mathematical work and in practical there is an inherent imprecision in any one particular method. The mathematicians, at least, have realized that in the nature of things there is inherently an imprecision in retrieval, or in any form of classification. If there were not it would mean that everything was known already. How one can handle at once different tools, each inherently blunt, in order to arrive at a reasonable answer is probably the major problem that is concerning people like myself at the moment. In other words, to see how far it is worth while pushing any tool, and how much should be left to intellects with a knowledge of the subject that does not come within one's own scope. This is not an unworthy task, by the way, because one does need to distinguish between what one must employ real, lively, intelligent people for and what can be done by fairly well-trained white mice (which probably will be quite a lot).

I shall not go into the question of the false distinction between 'data' and 'information', which is based on a sensible observation but has taken the wrong turning and become a waste of time; rather like the old analogue-digital arguments that used to waste everybody's time in the computer field some years ago.

Why are people doing all this? There is much talk of an Information Explosion; perhaps the word 'explosion' falls naturally to one's lips these days. Bar-Hillel last year pointed out at a seminar in the Office of Naval Research, and later on in an expanded version,* that to talk about an information explosion was nonsense. He said that if more was written, presumably there were more people writing and therefore more to read. The amount of matter people can write and read in a day is limited. Thus the answer is still exactly what it used to be; to wit, specialization. This argument, to my mind, begs the question completely because it is exactly *before* you get specialization that the trouble arises. For instance, something written for the purposes of astronomers may be equally valid and important in the field of obstetrics, and there is no means of knowing what to do about it beforehand. Thus pre-specialization is where the problem lies. This is a similar problem to the one of having a general classification as opposed to a sheaf of special classifications, which latter is what is more usually provided under the name of 'general classification'. The problem is a very difficult one indeed. But if almost anything is relevant to almost anything else, and everything is being developed very rapidly, it is very important not to waste too much time in getting hold of material which will be useful. I know one can only read for so much time a day. One might as well, therefore, employ the time reading what is likely to be useful. In practice where we have made real achievements in information systems it has been by confining ourselves to strictly local conditions. That is to say, most of the systems inform us what actual things actual people, such as Miss A, Mr B, and Dr C like; not people similar to Miss A, Mr B, and Dr C. That is very much more difficult. What one means by 'similar' is an appalling problem.

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* Bar-Hillel, Y. Is information retrieval approaching a crisis? US Office of Naval Research, Information Systems Branch, Washington 25, DC, December 1961.

It is generally assumed that documentation and information retrieval are worth while. To be dishonest, I think if I put my mind to it I could probably find examples when *not* looking and reading did a lot of good. The point is that in the long run the belief that information retrieval and documentation are worth while is an act of faith. So of course is the belief that education is worth while. One could probably put up quite a good case to prove it is not, but most of us believe it is, and I myself hold that it is a good idea to make what information or documentation exists available to those who can use it best, although no one can prove this absolutely. So the fact remains that the total span of material produced is a very great burden, and some special methods must be used, whatever they may be, to deal with it.

It may be apparent that I do not think too much of the effort made in this country. One of the great curses of the British way of life—it may be a blessing also—is the cult of the amateur. There are occasions when the amateur is just a nuisance. As I myself am, or was once, an amateur in this field, I have little to complain about. But I would still stress that the effort made in this country is not really anything to boast about, not so much as quality of what is done, but in the first place as to the provision of funds. Most of the research in this country is subsidized largely by American, not British, funds. Admittedly, to bestow enormous sums of money and resources on people would not be a very good cure either. One needs something in between. There are, after all, two ways of clearing log jams in rivers. The American system is usually to move all the logs out of the river. This is expensive, but it does clear the jam, and one learns a little in the process. In the English system, in my experience, one first pretends that the log jam does not exist. Then, when it is absolutely impossible to avoid knowing it is there, one says that, after all, only the best people do have log jams and this is good for national character. About twenty years afterwards one hopes that some enthusiastic amateur will come along, indicate the logs which are jamming, and then pick them out with his bare hands for the nation. People who are good at indicating which are the key logs are not necessarily the best people to lift the logs out with their bare hands. Similarly, people doing research are not the best people to assess the value of the research, or what it should be applied to, let alone administer it, unless they are very exceptional.

I would very much like to see the universities and library schools in this country provoking action on these matters. The gap between the universities and library schools, and the documentalists, is no wider here than it is in America, but there is no reason why it should not be narrower. Certainly I do think it is a disgrace that nearly all the work one can think of, in the field of documentation, done in the United Kingdom depends largely on the American taxpayer. The real reason is that people here do not think it is worth while. As Mooers has said, if people are penalized for using information, then they will not use it, no matter how good the documentary system or library may be. No doubt one can play on fashion, and the librarian call himself an 'information machine retrievalist', in which case he probably gets a lot of money. But the term 'librarian' is by no means a dishonourable one, and neither retrieval nor documentation is the whole, not only of librarianship but of making good use of records of any kind. They are a part of it only, and a great deal of what people sneeringly refer to as 'traditional' librarianship is very necessary indeed. I do hope that people with the rightful authority will pay some attention to the work that is going on, and help build it up. Nothing can be done in a hurry, especially in documentation. It is not a one-man job to be done in a garret by an isolated genius with a bent pin and a coil of wire (this is the way most people expect scientific work to be done). It cannot be done that way. The amount of transscription and the business of acquiring documents is enormous, before one can even start work. What should be done is to watch for promising work and build it up gradually. If the work is not properly done, then the funds must be taken away. It is no use presenting an individual, or a group of people, with a lot of money and a lot of computers—and moreover putting barbed wire round them—for this will lead to more empire-building per sq. ft. than any other way I know, and no good work gets done in the empires. In the long run, anything to do with information, as with education, must come from on top, not from down below. Some of the best firms and institutions that I came across in the United States are those in which the administration, the management, and the directors really believe it is worth while for their people to know what has been published, and encourages them to be interested. They did not consider that whereas the man with the soldering iron is doing some useful work, the man who is sitting reading is wasting his time. They would only think that the man who was sitting reading was wasting his time if he had been doing it, and nothing else, for about six months. Finally, one has only to scan the National Science Foundation *Science Information Notes* to see where the grants are going, and what has been done. About four column inches of this information would probably cover what this country has done in the last five years, and *Science Information Notes* comes out at least six times a year, and has a lot more than four column inches in it. I hope that someone will do something about this some time.

DISCUSSION

Mr H. F. Vessey (Ministry of Aviation), in opening the discussion, congratulated Mr Fairthorne on his lecture—he had covered a lot of ground in his talk and also apparently in his travels in the United States. He had noticed that Mr Fairthorne had not mentioned the National Aeronautics Space Association which had recently gone in for automation in a large way. He was particularly interested in the index and had been told that it was to be compatible with the ASTIA thesaurus. From what he had seen so far he found this difficult to believe. Could Mr Fairthorne comment? Secondly, he had been campaigning for some time for the supply of a tape-typewriter to TIL and was promised a BIMA as a Christmas present. Would Mr Fairthorne please advise on how it should be used?

Mr Fairthorne said that he had not mentioned NASA because it had only very recently awarded the contract (towards the end of 1961). Many people one hoped would have put in for it did not, simply because they were honest enough to say that the project was far too big for them to tackle.

He was not very happy about compatibility of the index and the thesaurus. ASTIA had a Compatibility Committee, which met every month in connection with the revision, and included several people from the Bureau of Standards, which is much concerned with compatibility, machine and otherwise. What, if any, steps NASA might be taking towards compatibility he did not know.

At least one other organization was having the same problem, and this was the Aerospace Corporation. This might lead to three separate incompatible indexes, though Aerospace seemed likely to conform with ASTIA. ASTIA itself was having difficulties about a vocabulary common to all parts of the thesaurus. On the use of tape-typewriters, he recommended practical experimenting with these, although it was an expensive hobby; he also advised keeping in constant touch about developments in the United States.

Mr A. E. Cornfield (BP Research Centre) asked if the speaker could give more information on the language difficulty, i.e. the difficulty of interpreting technical terms used by the United States and the United Kingdom. He wondered if the attempt to solve the problem of information retrieval by machines might be the wrong approach and if more consideration should not be given to co-operation between special libraries, thereby reducing duplication, and the storage of fringe material.

Mr Fairthorne replied that, in the long run, if one was dealing with inter-changeability of terms one must deal with people, because one was dealing with meanings. Once it was agreed outside the system that certain things were equivalent, this was told to the system. At the ASTIA meetings people got together on their own subjects to test them. One could not emphasize too much that machines are tools, and one of the good signs in the States is that they are being used far more as tools and to produce tools for the user than to do the user's job.

Regarding the very narrow field of actual storage and selection for specialist fields, he did not think that the theoretical work being done on syntax was very helpful in this application.

Mr Cornfield then asked if Mr Fairthorne would explain what he meant by saying that Peek-a-boo could be pushed too far. Mr Fairthorne pointed out that optical stencils, such as Peek-a-boo cards, like all selection devices were extremely sensitive to the exact conditions under which they were used. If they were used too fast or too slowly, for not enough people or for too many people, for too large a collection or too complicated a collection, or a collection invoked in too many or too complicated ways, costs would go up immediately. Any sensible person used Peek-a-boo only when he did not expect to get many answers. It was in fact a very much better system for proving non-existence or non-description. It was very useful, for example, for detecting the effects of drugs, because such queries could be put in the form of a request for the common membership of stated classes. Not all queries could be put in this form. He added that the system had developed into an expensive one because of the high costs of microfilm and apparatus for it. The notched card was probably better in some applications because the abstract could be put on the card, and this was cheaper than microfilm methods.

Mr A. J. Dickson (Ealing Technical College) pointed out that NASA was now circulating a letter asking for an exchange of bibliographies. He asked what use was being made of microminiaturization, and asked further what might be done by the library schools besides producing a few students for Part Four of the Library Association Final Examination, on dissemination of information.

Mr Fairthorne said that he had seen some examples of microminiaturization but could not say how useful they would be. On the question of what could be done by the schools of library science, he felt that the first step, and an important one, would be informal meetings between people from library schools and people who worked in this so-called new library field but had never been in a school of library science.

Mr R. Snel (Shell International Petroleum Company) said that he was more optimistic than the speaker about the potentialities of Peek-a-boo and had found that the keyword method in combination with Peek-a-boo could easily absorb forty thousand items. It provided reliable answers and the costs of equipment were very low indeed (£50 to £90).

The speaker replied that he had cited the figure ten thousand because he had complex queries in mind; but he agreed in principle with the questioner, and had in fact himself once cited fifty thousand items as within the scope of straightforward use of optical stencils. He thought that to keep the cost down to £50 was very good indeed. He added that duplication of stencils gave a lot of work, and mentioned a system where duplicate stencils were actually printed on translucent paper by computers. There was a converse, and very interesting, program, due to Mr Calvin Mooers, for punching the normal eighty-column card as an optical stencil when the index was given in the normal form of item first and terms afterwards.

Mr C. S. Sabel (UKAEA, Culham Laboratory) asked what future Mr Fairthorne foresaw for the abstract journals. Did he see them as mechanized retrieval instruments with feed-in from other places? And did he see them producing saleable tape? Or did he see them being broken down into smaller units?

Mr Fairthorne said that remarks about the future were always a little doubtful because people made wrong assumptions as to what purpose things were going to be used for. The motor-car, for instance, was primarily produced for transport, but in fact it created a social revolution (particularly in morals, for it not only provided transport, it provided portable privacy which no chaperone could cope with). Radio, again, was predicted as enabling a privileged few to listen to concerts from the Albert Hall. So long-term prediction was risky. The major use of mechanization, for quite a time, would be to provide tools for people to use collections of records or libraries usefully, rather than to allow somebody to shout a request into a microphone and producing something from a slot underneath. There would be certain exceptions in the case of very big institutions, where there would be a big computer with enormous internal storage, which would probably occupy from half to two per cent of its time in dealing with information queries. It would indicate the address of the microform of the required document, for the entire text of documents will not be stored inside a computer in the foreseeable future. Even to cope with ordinary bibliographical data and indicia we need to bring the cost of static stores down a hundred times and the storage capacity up a hundred times. The fact that a computer was turning things out and doing symbol manipulation at a high speed did not mean that one could get the actual documents, or even images of them on television screens, very quickly. Tape would not be used, he felt, for this kind of material because of the gross discrepancy between the rates at which you could move tape and the rate at which you could manipulate signals. Most machines of any size now did their operations somewhere round the microsecond scale. It was as well to remember that a microsecond was to one second as one second was to *twelve days*. If one part of a machine was working at a twelve-day rate and the other at a one-second rate it was going to be difficult to use.

Dr A. F. Parker-Rhodes (Cambridge Language Research Unit) then asked if Mr Fairthorne could give his opinion on the value of the work currently being done at Western Reserve University.

Mr Fairthorne replied that he had not discussed this because the papers of the conference in 1962 would be out very shortly. These gave full and frank accounts of the work being done. The people at Western Reserve were still finding their way in the field; they were fully aware of the defects of structural descriptions when carried to extremes, and they were using their experience to simplify the complexities and to cut down on elaborate rules.

Mr S. Marshall (AEI Research Laboratory, Rugby) said that the speaker had referred to the increasing publication and use of keyword indexes in the USA. An obvious weakness of such methods arose from the tendency of authors to write excessively cryptic titles for their papers, titles more arresting than accurate or informative. Even those titles that were intelligently and honestly chosen were in some degree inadequate for purposes of automatic indexing. The remedy was as obvious as the weakness—to synthesize a 'descriptive' title by adding (parenthetically to the existing one) appropriate 'terms' selected from the abstract or text of the article. This could be done by human agency (author or editor) prior to the computer stage, or by the computer itself, programmed for auto-quotation of significant words (probably at colossal expense). Mr Marshall asked if there was any thought or development along these lines in the USA.

Mr Fairthorne said H. P. Luhn at IBM had worked on similar lines. Machines could produce some kind of label. Documents must be machine-readable to start with. There would be difficulty in fields that had not yet acquired a fixed terminology. He added that an author who knew his paper was to appear in a keyword-in-context index was much more careful than he would otherwise have been about giving an informative title. The titles of chemical papers had improved appreciably since publication of *Chemical Titles*. Methods of indexing always affected authors. For instance, sensible people who wrote detective stories under pseudonyms arranged if possible that their name was Aaronson, or the like, so that their work would come top of lists, and also that their titles would have an initial 'A' somewhere in them so that, again, they would come at the top of the list. Some people were very clever at it. But a title frequently made no use of words that appeared in the actual paper. He was concerned with the emergent subjects because this was where the difficulties lay. When new topics had settled down into their specialities it did not matter very much how the selection was done. It was quite possible to predict what the titles of papers as yet unwritten were going to be, for a few years ahead. The point raised was an interesting one, but a title was after all a statement made by the author about his paper. Therefore it was on another linguistic level. It was not a quotation from the paper, even if it used words occurring in the text of the paper.

Mr L. L. Ardern (Manchester College of Science and Technology) mentioned some of the drawbacks of some American bibliographical tools, for example no contents pages to the series of *English Abstracts of Selected Articles from Soviet . . . Journals*; also *Current Review of the Soviet Technical Press* and *Technical Translations* listings were later than when the job was done by the Special Libraries Association. He thought that changes were often made for changing's sake and viewed with some alarm the reorganization of ASTIA mentioned by Mr Fairthorne. He asked if American librarians were satisfied with the bibliographical tools provided for them by official agencies.

Mr Fairthorne commented that the Americans in general, both users and producers of bibliographical tools, were as critical as the questioner. He should hear them. This was one of the reasons that so much was being done, for they were by no means satisfied with what had been done already. In ASTIA, certainly, a great many self-criticisms were voiced; one of the drawbacks was that it did not get very much customer response. Its customers were often the Services, who would simply ask for a bibliography of, say, everything on rifles with square barrels, and accept it without any word as to where it was going or who used it or whether anybody used it. A little come-back of this kind would be welcomed by ASTIA even if it were a bit of a nuisance. On the questioner's general point, as to whether the Americans were satisfied with what they were getting for their money, the answer was no, and they were trying to improve it. The important factor here was that they thought it mattered. Not everybody in this country thought it mattered, and this was the point the speaker had tried to emphasize. We could do with more blunt talking.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

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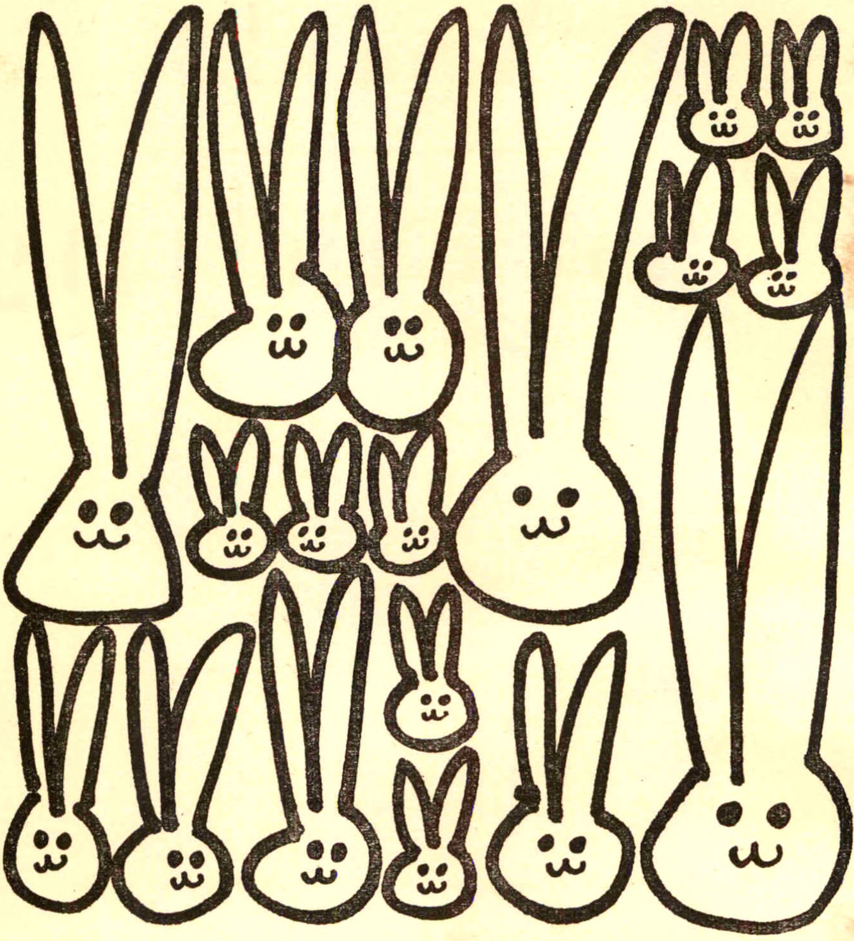

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 14 December 1962 Number 12

ASLIB CALENDAR 1962

December

WED.19. Christmas sherry party at Aslib.

1963

January

MON.14 – FRI.18. Senior introductory course to information work.

MON.21. Winter meeting at Aslib. 'Machines that interact with men', by G. Pask. See paragraph below.

February

TUE.5. Conference on Aslib Cranfield Investigation at Royal Aeronautical Society.

TUE.12 – WED.13. Course on work with patents. See paragraph below.

THUR.21. Winter meeting at Aslib. 'Getting and using scientific information for the *Financial Times*', by B. C. Boltz.

March

THUR.21. Winter meeting at Aslib. 'The British National Film Catalogue and its contribution to information', by B. Chibnall.

MON.25. Midlands Branch annual general meeting.

April

FRI.5 – SUN.7. Aeronautical Group and Engineering Group joint annual conference at Cranfield.

TUE.23. Midlands Branch 'summer meeting' at Coventry.

May

TUE.7. 'Information on a shoestring'—a course for part-time information workers at Nottingham.

June

FRI.14 – SUN.16. Electronics Group annual conference at Ashridge College.

Formal Opening of the National Lending Library

The National Lending Library for Science and Technology was formally opened on 5th November by Lord Hailsham, Minister for Science. About two hundred people were present. They included Sir Harold Roxbee Cox, Chairman of the DSIR Research Council, Sir Harry Melville, Secretary of DSIR, and many of the DSIR senior staff. Several of those who have played a pioneering part in promoting the establishment and growth of national scientific libraries were present including such well-known figures as Professor R. S. Hutton and Mr Max Nicholson. Lord Hailsham in his address called the library 'one of the wonders of modern Europe'. After the opening ceremony the visitors toured the library which was in full operation. This at present involves the dispatch of about seven hundred loans a day. Aslib sent a congratulatory Telex message to Dr D. J. Urquhart, Director of the library, and was represented at the opening ceremony by the Director of Aslib.

Group Representation on Aslib Council

The Aslib Council has recently agreed to co-opt the Chairman of the Standing Committee of Group Officers, in order that essentially Group interests can be adequately represented at meetings of the Council. We are pleased to announce that Mr N. E. C. Isotta, Chairman of the Electronics Group, has been elected Chairman of the Standing Committee, and has been co-opted to the Council.

Any Group committee which has Group matters it would like discussed by Council should give full information to Mr Isotta at the Ministry of Aviation, First Avenue House, High Holborn, London WC1, and should also inform the Director of Aslib.

Members of several Group committees already serve on the Council as the result of election in the normal way, but Mr Isotta's co-option means that there is now on the Council one person free to concentrate on the needs and interests of the Aslib Groups and to ensure that these are taken fully into account.

Winter Meeting

'Machines that interact with men, to teach, test and help to do a job' is the title of the lecture to be given on 21st January 1963 by Mr Gordon Pask, M.A., of System Research Limited. Mr G. H. Wright, A.L.A., Hertfordshire County Librarian, will be in the chair.

Mr Pask will consider what happens when human beings come into contact, or interact, with a machine able to adapt itself to the behaviour of human beings while they are performing a skill. The adaptations carried out by the machine are aimed at achieving certain objectives. Commonly these are to increase a man's rate of learning—in which case the machine is called a teaching machine; or it is to predict information about a man's behaviour in his particular environment—then the machine is an adaptive testing device; or it is to code his input data into an optimum form—the machine co-operates as an aid to performance.

Mr Pask will emphasize the use of these devices in training, though the other applications will be briefly examined.

The meeting will be held at 5.30 p.m. on Monday 21st January 1963, at Aslib, 3 Belgrave Square, SW1. Tea will be served from 5 p.m.

Course on Work with Patents

A course on work with patents and elementary patent law will be held at Aslib on Tuesday and Wednesday, 12th and 13th February 1963. The lecturer will be Felix Liebesny, B.SC., A.L.A., F.I.INF.SC., F.I.L., Librarian, The British Aluminium Company Ltd. This course is intended for people whose work is concerned with the administration and exploitation of patents, and will not deal with detailed aspects of patent law. The fee for the course will be 5 guineas. The programme is given on a leaflet enclosed with this issue, and applications should be made to the Education Officer, Aslib, on the form supplied with it.

New Guides to Periodicals

Four important new guides to the periodical literature of different countries have recently been published and some of their key features are described below.

Guide to Current British Periodicals (Library Association, 1962. Price 70*s*, 52*s* 6*d* to L.A. members). Nearly four thousand British journals are listed under subjects arranged by the Dewey classification, to which the titles and subject entries in the index refer. For each journal, besides the title, date of commencement, frequency, price and publisher, brief descriptions are given of the type of contents. Regular features such as book reviews, abstracts, lists of patents, and commodity prices are noted, also coverage by certain abstracting sources. Typographically this is a conventionally pedestrian publication, although readable.

Periodicals in South African Libraries (Council for Scientific and Industrial Research, and National Council for Social Research, Pretoria, 1961. Subs. £5 a year) and *Periodicals in the Libraries of the Federation of Rhodesia and Nyasaland* (University College of Rhodesia and Nyasaland, Salisbury, 1962. Price 2 guineas). Resembling the Commonwealth Scientific and Industrial Research Organization's Australian list in their loose-leaf binders for continuous amendment, these union lists of periodicals follow BUCOP in general arrangement, although Cyrillic characters are transliterated, and adequate space is given to the library holdings. The South African list, of which the letters A–B are now issued, is admirable in including both volumes and years of holdings. Neither list, regrettably, gives any indication of the contributing libraries' lending, reference, or document reproduction services.

Canadian Index to Periodicals and Documentary Films 1948–1959 (Canadian Library Association, 1962. Price $50). The Index provides a rapid source for recent Canadian articles. Few technical journals are indexed but these are included by specialized abstracting services with international coverage. The present volume gives both author and subject entries in a single alphabet, for the general and popular fields of Canadian writing, including poetry and short stories. Films are listed under 'Moving pictures', as well as with articles on their subjects.

American Men of Science

The tenth edition of *American Men of Science* is now complete, with the publication in 1962 of the volume for the 'Social and behavioral sciences'. These volumes are almost stupefying in the packed detail of information provided in their 22,000 entries. The history of each scientist's professional employment and interests, his present address and his association memberships, are given by intelligible abbreviations. Listing is alphabetically by name, and no index has been possible, but as a source of verification for authors' names, or as an address book, this is remarkably comprehensive. The four volumes of 'Physical and biological sciences' and the one of 'Social and behavioral sciences', are published by the Jacques Cattell Press, Arizona State University, at $25 each.

University of Florida Assistantships

The University of Florida Libraries are offering a number of graduate assistantships in the academic year 1963–64 for study leading to a master's or doctoral degree in a subject field other than library science. Stipends of $2,250 for a ten-month period require fifteen hours library duty each week; stipends of $3,000 for a ten-month period require twenty hours library duty each week. Holders of assistantships are exempt from out-of-state tuition fees. The final date for formal application is 15th March 1963, and application forms may be obtained from the Director of Libraries, University of Florida, Gainesville, Florida, USA.

Index to Theses

Volume II of *Index to theses accepted for higher degrees in the universities of Great Britain and Ireland,* covering the academic year 1960–61, has just been published. More than 3,200 theses are listed by subject and indexed by author and by subject heading, and information is given on their availability according to the rules obtaining at the various universities. *Index to theses,* volume 11, is available from Aslib, price 21*s* to members, 25*s* to non-members; it will be issued automatically to those who have placed standing orders.

NEW MEMBERS

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Miss M. E. George	Hayes
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ASLIB 36th ANNUAL CONFERENCE

Blackpool, 2nd–4th October 1962

THE programme opened with a paper by Professor Ritchie Calder. Mr E. J. Carter, lately Head of the Libraries Division of Unesco, was in the chair, and introduced Ritchie Calder as not only the 'top United Kingdom science reporter' but also as a man passionately committed to the task of interpreting science to the layman.

Aslib was lucky to snatch him between a round-the-world tour and a projected visit to Chile, and to get him to talk on a subject next in importance to that of war and peace—the needs of developing countries. Ritchie Calder, he said, was a man who never stayed put but was always on the spot, and in order to achieve this he had travelled 120,000 miles last year. His travels, his retentive memory, and his enthusiasm jointly made him a first-rate communicator, as they would see.

Calder had started his career as a crime reporter; it was up to the rest of us to see that he did not end his career as a crime reporter because of our failure to respond adequately to the need he so clearly described—the need to share our skills.

SHARING SKILLS: TECHNICAL AID TO DEVELOPING COUNTRIES

RITCHIE CALDER, C.B.E.
Montague Burton Professor of International Relations, University of Edinburgh

I HAVE just returned from four months in the countries of south-east Asia, where on behalf of the United Nations and all its specialized agencies I have been examining the effects of international aid. It was a very interesting assignment which might have been called 'Ten years after'. For ten years ago, also for the United Nations and its agencies, I went out to south-east Asia to look at the problems which modern science and technology might help to solve and at the technical assistance programmes which were then just beginning. On that occasion I started from Sarawak in Borneo, went to Java, Burma, Thailand, East Pakistan, India, West Pakistan, and Afghanistan. This time I went to the same territories, with the addition of Hong Kong (to see the refugee situation), the Philippines (to see a country saturated with aid), North Borneo, Sumatra, Malaya, and Nepal. Both in terms of geography and of projects the scope of this year's journey was much more extensive. I was asked to take into account not only UN aid but bilateral aid, the Colombo Plan, and the help from private foundations. I accumulated so much paper in the form of plans, feasibility reports, appraisals, and justifications that I had my own weight in excess baggage. I have all that and a confusion of impressions to sort out before I produce anything in the form of a considered assessment. What I have to offer here is rather like the despatches I sent back to the United Nations—a series of direct observations which have still to be qualified by judgments.

One generalization which I have to make is that, considering the thousands of millions of pounds of aid which, from all sources, but mainly bilaterally, have been poured into the region during the past ten years, the lot of the average human being is not much improved and in some cases is worse. This is due in part to a confusion of motives, as well as a lack of planning, in the distribution of aid, but even more to the population explosion. This, of course, was foreseen ten years ago, when it was obvious that if you had death control without population control the numbers were bound to multiply at an accelerating rate and offset the effects of material assistance. It is like running up a down escalator, or trying to fill a bath with the plug out. You have to move pretty fast up the escalator, or have the taps running full bore if you are going to maintain equilibrium.

I do not want to enlarge on the population problem, which is self-evident, except to register it with some examples.

For instance, I made a hazardous pilgrimage to north Luzon, in the Philippines, to see the oldest rice terraces still functioning in Asia. There is some dispute as to when the first rice cultivators migrated to Luzon from south China, or what is now Indo-China, but it was long before the Christian era, and those terraces have been producing ever since. They are quite fantastic. The terraces with stone-built walls, in some cases eighteen feet high, climb up the peaks from the deep valleys—living pyramids of growing rice. They are more grandiose in extent and height—sometimes a thousand feet—than the pyramids of masonry at Giza. Throughout all these centuries the cultivators have tended these terraces with the agility of chamois and the patience of Sisyphus. When floods wash away the terraces they will go down into the valleys to recover the soil and carry it back in baskets on their heads. The Igarots, the highlanders, are, apart from their skills as rice-growers, still a wellnigh primitive people and they are still practising headhunters. There are about twenty thousand of them in these valleys, just as competent and industrious as their ancestors, but in the middle of the rice fields there was a store at which they were getting Californian rice because they had exhausted the last rice harvest and were waiting for the next. All the productive skill of centuries was not sufficient to keep pace with the increasing survival rate. In the Philippines, generally, the population of twenty-seven million is increasing by seven hundred thousand a year and the food supplies, social services, schools, etc., are not correspondingly increasing. Over half a million children are unable to get into schools because of lack of accommodation. Only a third of those admitted in the first grade ever reach sixth grade, and only one in ten who start school ever finishes high school. The result is that talents are being squandered, juvenile delinquency is increasing and there is no real basis for the vocational training for the industries that are being introduced.

Central Java used to be the rice bowl of Asia. It exported extensively. Ten years ago I saw a most enlightened approach to the problems of increasing productivity. There was very little that one could teach the Javanese rice peasants, who had developed a sort of window-box economy, terracing every available foot of ground and, incidentally, ingeniously planting and harvesting fish with the rice—putting the fingerlings in when the paddy fields were flooded and collecting them when the fields were drained for the ripening of the rice. Nevertheless, with international help, modern improvements were introduced—state farms for better seeds, state fish nurseries to supply the fingerlings, artificial fertilizers (but more important, since those were expensive, the development of green manure), the growing of legumes which, ploughed back, could nourish the rice, and a system of enthusiastic extension officers, to pass on knowledge of better practices. Incidentally, 'sharing skills' can be a form of reverse lease-lend. The FAO—the Food and Agriculture Organization of the United Nations—in trying to encourage inland fisheries in protein-hungry parts of the world, found that the wise thing to do was to send students on fellowships from Africa, the Middle East, the Caribbean, and so on, to study fish husbandry under the illiterate Javanese peasants. Central Java has taken advantage of these improvements and the peasants work just as hard, but production is not keeping pace with reproduction. They are having to import rice, the United Nations Children's Fund has been distributing dried milk and has introduced a soya product—saridele—but I saw, in some parts of the hinterland, gross clinical malnutrition. Children are visibly suffering from kwashiorkor, the protein-deficiency disease which turns their hair rusty red, cracks their skin like a crazy pavement and condemns them either to death or to a miserable life. There is xerophthalmia, the blindness due to vitamin A deficiency. There is hunger oedema, the swollen belly of a famine baby; and toxicosis, which produces dehydration in infants. This is so serious that they have day and night staffs at the clinics standing by to provide the transfusions without which the children would die.

These are hunger diseases, in a countryside which traditionally has been an example to the world of intensive cultivation. The population is increasing at a rate of 2.3 per cent per annum. This means that Indonesia has to find food for two million extra mouths every year.

In the Delta region of eastern Bengal—East Pakistan—I saw an ambitious irrigation scheme, backed by the UN Special Fund; this pumps water from the Ganges on to a low plateau, which, unlike the perennially drowned lands of the Delta, suffers from drought because of lack of precipitation. Through a system of 665 miles of canals with 380 engineering units there will eventually be irrigated 1,800,000 acres, capable of producing three food crops a year. This sounds impressive until you realize that the population which was forty-three million when I was there ten years ago is now fifty-four million. They were hungry then and they are more hungry now.

The population of India is increasing by ten million a year. That is to say, a population equal to that of greater London or greater New York is added every year. Orissa, which if it was not the actual birthplace of rice was certainly its kindergarten, is historically a rice-exporting area. Here, too, rice is being imported to feed rice growers. Industrial expansion, however spectacular in India, can provide neither the work nor the products for a population with this rate of increase. All the investments of the past ten years in the textile industries of India have not added an inch to the average Indian's shirt!

Obviously this population problem is one which has to be dealt with. It is no good saying that the earth is capable of maintaining ten times the present population of three thousand million. What is frightening is not the figures but the speed of the increase. It has taken *homo sapiens* two hundred million years to reach the present figure of three thousand million. On present trends it will take less than forty years to double that figure. The immediate and inescapable challenge is that by 1980 we shall have to contrive to feed another thousand million people. It will need all our shared skills and scientific ingenuity, and a great deal more international effort than exists at the moment, to provide the answers.

And the answers will have to be something different from those we are providing now. It is true that there are vast surpluses of food in the Western Hemisphere. Ten years ago there were thirty-five million metric tons of surplus wheat and coarse grains. Today we have the incredible figure of 125 million tons of such surpluses in the world—mainly in the Western Hemisphere, where the United States Government has spent $4,000,000 in price support schemes, buying farm surpluses to keep up the market value. The United States is not ungenerous in making these foods available. I saw in south-east Asia something of the operations of SAC—Surplus Agricultural Commodities. Under this scheme much-needed foodstuffs are made available to governments, which market them and use the proceeds, in terms of their own currency, for agreed development programmes. This is a way of using food as currency. The FAO, with supplies made available to it, is going to extend this principle multilaterally.

I am all for it because it recognizes that, while emergency relief of this sort is necessary, countries cannot be left dependent on surpluses in the long term. As the United States has shown in the so-called 'Soil Bank', it is cheaper and, it can be argued, better for the soil, to pay farmers *not* to cultivate acres than to buy the produce of these acres and put them into store. Thus for reasons of internal economy or of international politics surpluses can be curtailed. In any event, there is the problem of distribution. There are not enough ships' bottoms in the world to redistribute that 125 million tons. There never has been an *Indian* famine. There have been Orissa famines, Bengal famines, Bihar famines, and so on. A harvest catastrophe, like the rust-plague in Bihar, will produce a local or regional disaster, and, vice versa, it is locally and regionally that we must help people to supply themselves. They must be enabled to improve their agriculture by methods which, through penury, peasants are unable to afford, or through ignorance cannot apply, or through systems of land tenure cannot extend.

We can share our skills with them, sometimes unwisely as applying temperate-zone agricultural methods to tropical soils which are quite different. But even if we did it wisely, well-meant efforts will be frustrated if the peasants have not got the means. That is why the SAC is a promising experiment, away from conventional economics. For example, in Indonesia, Nepal, and elsewhere I saw the proceeds of SAC being invested in agricultural centres, research stations, training colleges, and breeding farms (cattle, poultry, fish culture, and so on), which were ways of helping the peasants to help themselves.

But we need new thinking in other directions as well. What is self-evident is not necessarily right. For example, as an old desert hand myself, I have tended to be very glib about 'bringing water to the desert'. Having travelled through and flown over large tracts of Pakistan and Afghanistan, I have had drastic second thoughts.

The population of West Pakistan increases by ten every five minutes, and every five minutes an acre of land is lost. Seventy million acres of West Pakistan is desert—arid for lack of rainfall—but it is also the land which the rivers, particularly the Indus, created, and those alluvial regions like the Sind are very flat. Superficially the soil, given water, is good. So seventy years ago they began to recover this region by irrigation. A succession of barrages have been built on the Indus. To British times belongs Sukkur. Ten years ago I was enthusiastic in my approval of the structure and purpose of the Kotri Barrage on the Lower Sind, east of Karachi. This was to bring into cultivation two million acres. This time I went to see the completion of the Gudu Barrage right in the middle of the Sind Desert, on the Indus, half-way between Karachi and Lahore. No more desolate site in the world could have been chosen, and the construction, directed by experts under the UN Expanded Technical Assistance Programme, is an engineering achievement of first magnitude. It is 4,500 feet long and has cost about £30 million. This is to provide controlled irrigation to 2,870,000 acres through three main canals. Today the problem of Kotri is the problem of salinity and that, ten years from now, may be the problem of Gudu. The irrigated lands are being poisoned by salt. The effect of spreading water by irrigation canals without corresponding mechanical drainage systems has meant that the water table has risen. There is very little rain, but the spreading of the water of the Indus under the conditions of heat has meant that the surface waters, in high evaporation, have led to an aggregation of salt and the underground waters have brought up salt from the subsoil. The result has been to create a kind of salt pan. Meanwhile, other barrages have multiplied all over West Pakistan, and irrigation has led to water-logging. The result is when you look down from the air the countryside looks as though it is suffering from a malignant disease. Twenty families a day on the average are losing their farms through salt or sogging.

The situation is so serious that the President of the United States sent out a powerful scientific mission, which included his own scientific adviser, Dr Jerry Wiesner, to study the problem. I have spoken to members of that mission and they are appalled by what they have found, and one estimate I was given for the cost of restoring the havoc which has been wrought in a single generation was a thousand million dollars. I emphasize this case because in discussing the sharing of skills we have to consider the skills we are sharing. I am becoming more and more oppressed by the tyranny of the experts. By 'tyranny' I mean the domination which the expert exercises with the authority of his expertise. He may be the master of his subject, but he knows very little about anything else. It is no part of the job of an engineer building a barrage to consider the hydrology of water-logging or salination. It was no part of the job of the agricultural experts who surveyed the suitability of the soil of the Lower Sind and, ten years ago, found it in 'good heart' to consider the effects of raising of the water table. Each pursues his single-minded purpose and the mistakes which are made by default are exaggerated by the vast amounts of money which will go into a crash programme to find a self-evident answer to a self-evident need.

The same sort of thing happened in Afghanistan. Six hundred years ago Tamerlane and his hordes destroyed an irrigation civilization in the valley of the Helmand and the region around Kandahar and reduced a productive area to a desolation which persisted until ten years ago, when the Americans went in to build a great barrage and canal system to restore the productivity. I saw that area from the air. It is incredible that in so short a time land could be reduced to such a scabrous condition. It glistens with salt.

With this kind of lesson the United Nations is now trying to forestall such mistakes. It has launched million-dollar schemes for land and water survey. This is the kind of investment which it was no one's job to undertake before. These are 'feasibility projects'—anticipatory wisdom. In that wisdom the large-scale projects which might follow may be discounted but at least irreparable damage may be prevented. The classical example was, of course, the British ground-nut scheme in Tanganyika, where £32 million might have been saved if the ecologists had gone in ahead of the bulldozers to appraise what would happen if you upset the balance of nature. If someone had studied the rain-shadow instead of simply looking at the rainfall records, they might have known in advance that they were putting the scheme on the wrong side of the hill. If someone had done a ground water survey, in short instead of looking at it merely as an engineering operation—a soil-mining operation, they would have done what the Special Fund is now doing.

The trouble over the past ten years has been that most things have been regarded in financial terms. I do not mean that money is unimportant. We shall have to spend vastly more money if we are going to remove the increasing disparity between the highly advanced countries and the poverty-stricken countries. But the having to argue with Appropriations Committees of Congress, or the Treasury, has produced a wrong attitude—that the answers can be found in the number of zeroes behind the sterling or the dollar sign. Of course they cannot. What we are really talking about is a redeployment of resources, and the most important of all resources are human resources. I shudder when I hear politicians talking about 'allocating one per cent of the national income' to underdeveloped countries. This is the spirit of the flag-day, of the charity-minded, who feel noble and generous when they have paid their subscription. What we should be talking about is the use of our resources both in terms of materials and skills to help those countries to help themselves.

Indeed the story of international aid since the end of the Second World War is not a very impressive one. The decent instinct and enlightened self-interest were there, sixteen years ago, but the approach was wrong. The answer obvious at the time was the World Bank. On my recent south-east Asian journey I have been agreeably impressed by the enlightenment and imagination of the Bank. But by definition it was a restricted instrument. It had to abide by the principles of sound banking. No matter how 'soft' or 'long-term' the loans might be, the countries would eventually have to redeem them and, moreover, the projects which the Bank could finance had to conform to 'sound' banking principles. The criterion was that they 'had to pay off'. It soon became obvious that the World Bank was not an effective answer. Then we had to have the Technical Assistance Board which, operating largely through the specialized agencies of the UN—FAO, Unesco, the World Health Organization, the International Labour Office, etc.—could demonstrate what might be done. But this became 'window shopping'—like walking down the high street and seeing, behind plate glass, the things you might have if only you could afford them. So in turn we had to have the Special Fund which could finance projects which were far-sighted, but unpredictable in any terms which bankers would understand, and we have also had to have IDA, the International Development Association. This is an adjunct of the World Bank but its purposes are defined as 'to promote economic development, increase productivity and thus raise standards of living in the less developed areas of the world, in particular by providing finance to meet their important developmental requirements on terms which are more flexible and bear less heavily on the balance of payments than those of conventional loans'.

The moves are all in the right direction. The 'philosophy' is increasingly concerned with 'investment in human resources'. Now what is meant by that? This is what I would consider the real infra-structure. The economists think of the infra-structure as preparing the physical amenities which will produce a flow of investments. These have been conceived as ports, railways, roads, telephones, electrical supplies, which it is not the job of an industry itself to create but rather to take for granted. But in populated countries surely the most important factor in the successful development of industry is the human material available. It is difficult to build a factory on a bog and it is just as difficult, if not impossible, to build modern industry, the developments for which those countries are looking, on a morass of poverty—sick, hungry, and ignorant people.

This was recognized in the charters of most of the UN agencies, but what they represent has received a relatively small part of the thousands of millions spent in aid over the past ten, or sixteen, years. The World Health Organization, WHO, has done, with the help of the United Nations Children's Fund, a remarkable job in reducing the mass-diseases, with the result that people are living longer; children are surviving the lethal diseases of infancy and the hazards of toddlers to marry and to multiply. It has had the advantage of a medical breakthrough in terms of the antibiotics and the insecticides. The result is that the span of life in India, which was about thirty in 1946, is about fifty today. This in callous demographic terms means that the average mother who might have died at thirty can have fifteen more children.

FAO has not had the advantage of such a breakthrough. Agriculture is a way of life and it is very difficult to change a way of life. You cannot multiply acres as fast as you can multiply children. And today we have the Freedom from Hunger Campaign, emphasizing the need to help people to help themselves. The answers do not entirely lie in mammoth projects, like irrigation barrages.

They can effectively lie in simple ways, like improved seeds, new forms of rice, simple improvements in cultivation, rural industries to take the surplus population off the land, from sub-subsistence farming of too small plots, so that better methods can be employed.

Unesco has had a tougher assignment. It is a truism that sick and hungry people cannot learn, so that, in a way, it has had to follow WHO and FAO. But it also has to traffic in ideas and has been hampered by the ideologies of the Cold War and the suspicions in new countries of outside influences on the minds of the young. It has also been confronted by the difficulty that, while the principles of universal education may, indeed, be universal, the practices are definitely not. I know that it is according to the book to use radio-teaching where there is a deficiency in the quantity and quality of teachers, but I found it uncomfortably incongruous to hear a Big Brother voice, with a decided BBC accent, thrusting its way into a jungle schoolroom and saying in barrack-square brusqueness: 'Now, teacher, ask the children to repeat after me. . .'. Perhaps it is good pedagogy, though I doubt it, to talk about the Eskimos to longhouse children on the equator. It is at least better than the affliction of Eskimo children whom I heard being taught the dates of the Wars of the Roses and kerb drill (although they had never seen a wheeled vehicle) one hundred miles north of the Arctic Circle. The other manifest difficulty is that teachers are the academic untouchables, the professional sweepers, badly paid and poorly regarded, everywhere as far as I could judge except in Malaya, where they are paid and treated as an élite—as they should be if we want the best for the new generation. They are supposed to be equipping young minds to staff, and to make the most of the opportunities provided by, the material developments—new steelworks, new factories, and new services.

'Find me ten thousand teachers,' said Biju Patnaik, the Chief Minister of Orissa 'and I will solve the problems of my state.' What a hope! There are not ten thousand teachers to be had. There are not the schools in which they might teach. The parents of Orissa cannot afford to let their children go to school, or, if they should, to keep them there long enough to acquire any good, because the children are wage-earners in impoverished homes.

In Orissa there is the vast steelworks, built in a jungle by the West Germans. It was scheduled to produce one million tons of steel a year. It has fallen short by 60 per cent. The West Germans blame the labour supply—untutored tribesmen. But the truth is that they did not *share* skills; they *imposed* their own. They transferred the practices of the Ruhr to the jungle, without really acquainting themselves with the eccentricities of the ores and coals, let alone with the peculiarities of the peoples. This is another example of the tyrannical assumptions of the experts.

The converse was expressed by the Chief Minister; he said, 'We have exchanged a political imperialism for an industrial imperialism. We have no trained people to replace the Germans. We have good scientists but we have no foremen, because we have no cadre of adequately educated people.'

Which brings me to my own cliché: the developing countries are being frustrated by the missing piston-ring and the missing foreman.

By the missing piston-ring I mean the shortage of spare parts and the inability to improvise them. People who travel abroad know the gripe about the failure of British motor manufacturers to provide proper servicing and adequate spare parts. Magnify that into all the machines and instruments which are wished on to developing countries. I say 'wished on to' because there is a good deal of huckstering which masquerades as aid. There are mechanical surpluses as well as agricultural surpluses. There is a tendency, of spurious good intention, to provide obsolete, or obsolescent, machinery for new countries—like benevolently giving a dress to the char. But if they are obsolete or obsolescent it also means that the spare parts have been discontinued. If they cannot order parts—or if they cannot get them for months—and if they cannot have the skills to improvise them, then factories, or vehicles, stand idle. Maintenance is one of the biggest problems in the world today. I know it is unfair, but not entirely untrue, to say that it is like offering a competitor a car which you don't want and which the pits cannot handle. You will win the race, while pretending he is in it.

And then there is the missing foreman. It is true that I meet everywhere excellent indigenous scientists. Most of them—at least in the top bracket—will have been trained abroad. They will have been trained away from the conditions in which they will have to work (for example, doctors who never go back to the villages where they are needed), but even if the research conditions exist the difficulty is to transfer them technologically to the factory floor or to the market (for instance, multi-purpose food). There is the missing foreman.

This brings me to the unappreciated role of the International Labour Office—unappreciated, that is, in the uninformed world outside the countries it is helping. Ten years ago, when I told the French photographer who was going with me that ILO was part of our assignment, he exploded. He was not going to the jungle, he said, to photograph filing cabinets! That—the idea of papers and conventions, conditions of service, wage-agreements—is still very much the impression which people have of the functions of the International Labour Office. But its present role is very different. It is out there in the field, roughing it with the rest of them. It is, with FAO, encouraging the development of rural industries. It is helping to create producer and consumer co-operatives, like the co-operative store I saw in the treetops in a longhouse in equatorial Borneo. It is organizing and staffing polytechnics and training courses for operatives, foremen, managers, and productivity experts. In East Bengal it is training marine diesel engineers—very important work in a region where most of the transport is by river. All this is going on, but still on a small scale in relation to the magnitude of the problem; although I think most of my ILO friends in the field would agree that, both in scale and quality-wise, it would be difficult to extend it very far; this is because of the lack of primary schools, middle schools and high schools to provide the proper intake.

All this is duplicated, multiplicated, in terms of bilateral aid—American, Russian, West German, and so on. It begs the everlasting question of how you get the people to train if there are not enough primary schools to provide the intake.

It also raises the question of what sharing skills really means. Surely it means the transfer of knowledge and experience. Neanderthal man was backward because, while he had the instincts of the tool-making animal, he could only demonstrate because he could not articulate. The skills of the Neolithic onwards were due, undoubtedly, to the powers to communicate. It was possible in the long traditions of the crafts and guilds to pass on the mysteries from master to apprentice, and for skilled men to travel everywhere, without necessarily knowing other languages, like the freemasons carrying the diplomas in the rituals and code signs which certified their craft-qualifications as certainly as the letters after a graduate's name. England, in the first Industrial Revolution, managed to mechanize illiteracy and, in the smugness of industrial success, postpone education until 1872. But in the nineteenth century other countries in Europe, and the United States, wanting to get in on the Industrial Revolution, recognized that there was an alternative to the master-to-man transfer of skills; that it was possible to *educate* people in technics. Classroom teaching could be a substitute for apprenticeship. This led to the establishment of the École Centrale of Paris and the polytechnics of Germany and Switzerland. The first country seriously to challenge Britain was Belgium and for reasons as coercive and urgent as those which prevail in the underdeveloped countries today. When Leopold became King of the Belgians, being Queen Victoria's favourite uncle and having spent most of his time in Britain, he had insight into the nature and practices of British industry. In 1842 primary schools were made compulsory in every commune in Belgium. In 1845 over half a million Belgians were unemployed because British mass-produced line had destroyed the handloom trade. This coincided with a crop failure, and the government had to undertake public works. These included the building of railways, canals, and roads, but they also included schools, technical schools and technical colleges, and model workshops, where the products of an educational system could acquire the skills. Because of the compulsion of circumstance, Belgium had to artefact an industrial revolution and did so with such success that it got the contract for an iron bridge in Glasgow, in the heart of the iron and steel industry of Scotland. (It was quite a shock for me to get an invitation to the centenary of MIT and to realize that in Massachusetts there had been a technological college forty years ahead of the consolidation of Imperial College in the country which had fathered the Industrial Revolution.)

The transfer of knowledge today can be by example—by the introduction of experts to demonstrate what can be done provided that they have competent indigenous counterparts who can function when the experts leave—or it can be by educational methods which can be initiated, and, later, 'topped up' by experts from abroad, or by sending students abroad. But the only way it will 'take', as one says of vaccination, is if there are prepared minds, like the sensitized film which accepts the photographic image. There is no substitute for a grounding in education.

Now I want to say as emphatically as I can that, wherever I have been on my recent journey or on any other journey, there is only one hunger which is greater and more clamorous than belly-hunger and that is brain-hunger. In most of the countries I have visited they are working two and three shifts a day in the available schools. It is not only the children; it is the adults. Anti-illiteracy is not just a cult; it is a conscious need.

There is a famine in books—at every level. I am a good internationalist and not a bit chauvinistic but I deplore the failure of British publishers who fail to recognize the fantastic opportunities which enlightened self-interest provides, and which the USSR has recognized—not, I want to say, with subversive motives; any merit they acquire is by making textbooks cheaply available, either in the languages of the country, or, more usually, in English. How can business men, and that is what my own publishers certainly are, ignore a market of 1,250 million in the area I have just left? I find my publisher friends anxiously canvassing the possibilities of the Common Market. It is nothing compared with the ravenous craving for the printed word in underdeveloped countries.

Let me give you an example: for devious reasons Afghanistan up to now has had English (that is American), French, and German *lycées*. It now has a quite impressive university with an oversubscribed medical school and science faculty. The students arrive—including, nowadays, unveiled women—with the disability of language. The foreign professors lecture in whatever may be their own native tongue, with their Afghan counterparts (their associate professors) acting as interpreters into Afghan Persian—the only common ground for those who have been brought up in English, French, and German. The library is pathetic. The students have no proper textbooks and can only work from the cyclostyled Farsi lecture notes. Presently, the Russians are sure to move in and provide books in Farsi—accompanied by fellowships to study in Moscow.

I make it a rule when I am speaking to experts never to discuss their own expertise. My only qualification here, or in the University of Edinburgh, is to tell the experts the conditions in which, in a world which is now a planet shrunken by sputnik, they will have to apply their expertise. I have seen quite a lot of libraries and documentation centres on my recent travels. They are, within limitations relative to the magnitude of the problem, doing a magnificent job. But tell me how, for instance, we are going to meet the needs of the sixty-six medical colleges which have been opened in India, either in terms of essential medical literature or of qualified teachers.

We can only help people to help themselves. We cannot do their jobs for them. But 'we' means the comprehensive 'we'—the people of the whole world. There is no longer any compartmentalization. We are all in it together. The impoverished countries are, in our shrunken world, like a slum at the bottom of our garden. Contagion can spread from it. The slum-dwellers are liable to die of hunger on our doorstep. They lower the tone of the neighbourhood and devalue our own prosperity, but they are also a constant shame and reproach to us.

Sharing skills is the least we can do. We have to do much more. We cannot treat this as putting money in the blind man's tin. We have to give all the knowledge and experience which we have got and support them by redeployment of our resources. We will not do that by exchanging minibuses for Mercedes cars in the bazaar and mart of a European system. There has to be much more fundamental thinking. By 1980 only one in four of the four thousand million souls on this earth will be North Temperate Zone Man—a useful term for evading, while including, American, Russian and the potential Common Market of Europe. The other three will belong to the countries which we now call 'underdeveloped' without which, and their resources of raw materials, the highly developed countries cannot maintain their standard of life. The only way of maintaining or expanding those standards is to ensure that the other countries develop their resources to their own, and to our, benefit. For the last ten years we have never had it so good and Jack has been all right because we have been exploiting the cheap commodity prices of those countries. As Hammarskjold pointed out, a 5 per cent drop in the trading figures of any underdeveloped country wipes out the good effects of all aid, multilateral, bilateral, and private investment. In the last ten years the gap between the wealthy nations and the poor ones has not narrowed; it has widened. The wealthier ones are much wealthier and, by comparison, the poor are much poorer—a sorry comment on 'the bold new programme' which President Truman announced. There is something dangerously wrong, economically unsound, and morally outrageous in the present situation.

The 'shared skills' are a common heritage which by reinvestment—investment in people—can enhance the riches of this, our earth.

DISCUSSION

The Chairman invited questions and comments, remarking that in the field of communication Aslib was well aware of the need for sharing skills.

Mr A.H. Holloway (Admiralty Centre for Scientific Information and Liaison) asked first why it was that the early irrigation of Afghanistan, destroyed by Tamerlane, had not led to soil-salinity; and secondly he remarked that sharing of skills seemed always to increase the population out of proportion to subsistence.

The speaker answered that the early irrigation, being less widely spread, had drained back to the river as an 'inland delta' but that the wider and shallower recent schemes of irrigation did not flow back to the river and deposited salt over the whole area. To the second comment he replied that if people have to live like animals they will breed like animals. The gradual emancipation of women, through meeting Western professional women in clinics and through other technical aid services, and the slow process of education would gradually improve conditions and lead to birth-control as a counterpoise to death-control.

The Chairman in thanking the speaker regretted that there was so little time for discussion but pointed out that, thanks to British Railways, Ritchie Calder would be spending an extra day at the Conference and delegates would therefore have opportunities for further enjoyment of his wit and knowledge.

THE FOREIGN LANGUAGE BARRIER

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IDEALLY all science should belong to everyone, in the sense that everyone needing scientific information for whatever purpose ought to be able to procure quickly the most apposite items of the whole world's literature and be equally able to understand and use them wherever they come from.

That ideal, we all know, is very far from being realized. There are two main obstacles to its realization. One of them is not so much a 'barrier' as an *embarras de richesses*: several millions of new scientific publications appear every year—to say nothing of the millions upon millions already heaped up in the world's libraries—so that it is difficult to narrow down the choice to the best few for meeting any given individual's needs at any given moment. How to overcome this difficulty is the basic problem facing special librarians or information scientists or documentalists or whatever you like to call them.

It is not, however, this problem that I have been asked to talk about this morning, but the other major hindrance to the universal and equal availability of all written and spoken information: the foreign language barrier. Properly speaking, that title is a misnomer: it should be in the plural. There is not one language barrier but 2,796 of them, if you want to include all subjects and levels of discussion, that being the approximate number of languages (apart from dialects) which linguists have distinguished and classified. If you think that number unrealistic for consideration you can reduce it to seventy-five, which is the number of languages for which people have thought it worth while to make scientific or technical dictionaries as listed in the Unesco Bibliography,[1] or you can say there are between thirty and fifty barriers if you want to consider only those languages in which significant amounts of pure and applied science are published, that being about the number from which, for instance, the Commonwealth Agricultural Bureaux and also the medical abstracting journals make occasional abstracts in English. The relative amounts published in different languages vary somewhat from one branch of science and technology to another. For instance, there is evidence that something like two-thirds of the world's engineering literature is in English but only about half the world's chemical literature is in our language. Indeed that was the case ten years ago, since when German has probably caught up again and the output of Russian has undoubtedly continued to increase in all branches of science.

Statistics on these matters can be only fragmentary and indirect. They may be found, such as they are, at the beginning of the report on *Scientific and technical translating and other aspects of the language problem* published by Unesco in 1957.[2] But probably it would not be wrong to assume as the overall order of importance

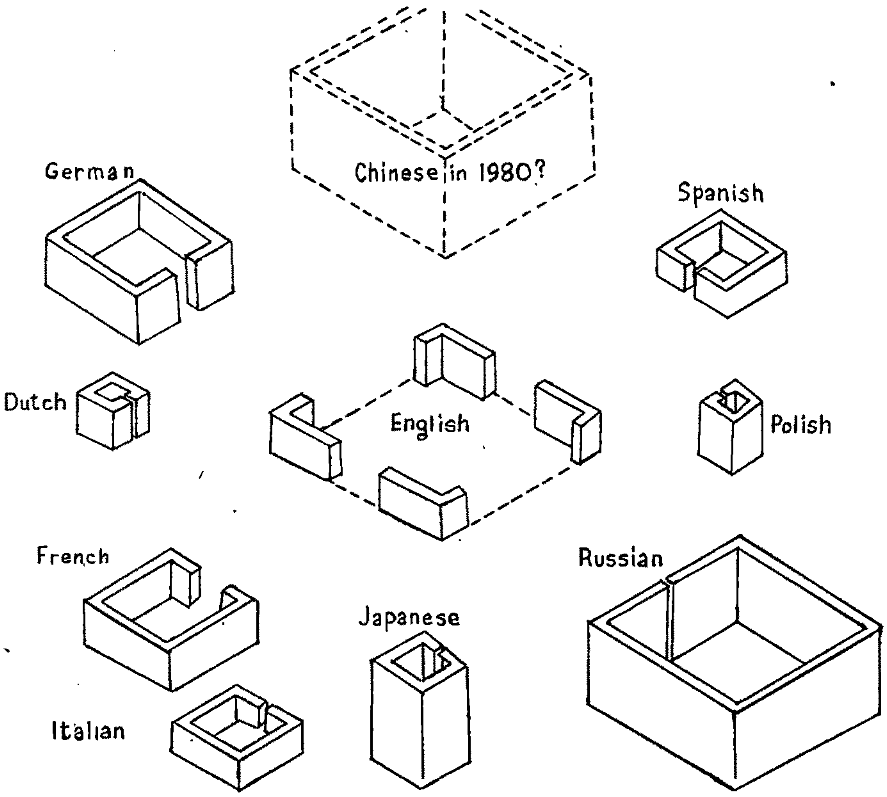
English, Russian, German, French, followed a long way behind by other Slav languages such as Polish and by Dutch, Italian, Japanese, and Spanish, which I have named in alphabetical order of their English names as I just do not know in what order they should come as regards the amount of scientific literature now published in them.

I have mentioned here nine major languages but there is a tenth which, unimportant at present, may in twenty or fewer years' time even exceed Russian or English: namely Chinese. When we consider that something like one-quarter of the world's population speak that language, and that this very intelligent, very hardworking people (as I know from having once lived among them), increasing at such a rate that there are now 150 more of them than when I began this talk, is busy revolutionizing its economy, its industry, and its education on modern lines, the surmise seems inescapable that Chinese is a language in which significant quantities of worth-while scientific information are destined to be published. But this is speculative.

The upshot of what I have tried to indicate up to now is that, so far from all published science being freely available to everyone, English readers are losing the potential benefit of at least half of it except to the extent that either they are able to read foreign languages in the original—including Russian, and a few years hence probably including also Chinese—or to the extent that the foreign literature is translated into some language which they are able to read.

Yet there is absolutely no justification for assuming *a priori* that the potentially most useful item of information to assist any given scientist in meeting any given purpose at any given moment is more likely to have been published in one language than in any other. The best item is no more likely to exist in the fraction of the world's literature which he happens to be able to read for himself than in the perhaps equal or larger fraction which, so far as he is concerned, is running to waste because it has not been translated and he cannot read it in the original.

In the picture shown on page 415 I have tried to represent the situation quantitatively—though, in the absence of proper statistics, of course only as regards relative orders of magnitude. It is as if the scientific products of each language area are shut off from the rest of the world by a wall through which, except in the case of English, there are only narrow slits. Chinese is represented as a sort of spectre overtowering the rest in 1980. The areas of these linguistic citadels in my picture are supposed to be proportional to the amounts of scientific literature published in those languages. The widths of the slits in the walls are supposed to be proportional to the total numbers of scientists of other mother tongues who can read the language in question. For how those proportions have been assessed I must refer you to the Unesco report, which itself shows them in a different sort of diagram. If you want to carry the imagery further you can imagine tunnels driven under the walls, the cross-sections of which are proportional to the amounts of translating done from each language, though how to estimate these cross-sections I do not know (statistics of language use are a subject badly needing research—it might be a good one for a Ph.D. thesis). You can also think of U-2 flights taking place over the tops, representing the efforts of abstracting and referencing services to find out and tell us what



is inside so that we can decide whether it is worth exploring further (with the difference from world politics that those inside will not in the least mind our doing so). Finally, the heights of the walls are meant to correspond with the relative difficulty to an Englishman or an American of learning the respective foreign languages—but this of course is purely impressionistic on my part.

I have drawn this picture with the English citadel in the middle, and the openings in its walls are meant to be proportional to the numbers of foreign scientists and technologists who are able to read English (which incidentally is a very much bigger proportion than the other way round). As both I and my present audience are anglocentric by education and outlook this seemed the natural way of drawing it; but we ought to beware of adopting too anglocentric an attitude when considering the question of an international language, as I shall in a moment. And even from a national and business point of view, exports of scientific information are just as important in the long run as imports.

Looked at this way, the damage which has ensued to science and to human enlightenment and progress in general, through the imprudence of the Israelites in starting to build a Tower of Babel, becomes sufficiently striking. That being the situation, what can be done about it, and what is in fact now being done about it?

Before I attempt to answer this, let me say two things. For brevity I shall use the single words 'science', 'scientific', and 'scientist' in a very broad sense to cover all branches of the natural sciences and social sciences and their applications in industry, engineering, medicine, agriculture, and so on. Secondly, I am concerned here with languages solely from the standpoint of their use as vehicles for the transmission of information and arguments relating to these scientific subjects, not with what is perhaps the higher use of languages, the conveyance and stimulation of emotive or evocative effects as in literature properly so called. This distinction is important. It is the one which Professor R. O. Kapp in his excellent manual *The presentation of technical information*[3] makes between 'functional' and 'imaginative' English, or between what J. B. Casagrande has called 'pragmatic' and 'aesthetic'.

In principle there are three ways of reducing the impairment of its unity which science suffers through being published in such a variety of languages. One is to do whatever may be possible to reduce the number so used: as it were to run several or all of the citadels together. Another is to do whatever may be possible to improve the ability of scientists to read one another's languages so as not to need translations: as it were to widen the slits in the walls. The third is to do what may be possible to amplify and improve the supply of translations.

As regards the first, it is obvious that if one language of scientific publication were tending or could be made to oust the others (or some of the others) and if all scientists were to learn to read that language, the need for learning other languages or for making translations would be correspondingly reduced. As regards this happening of its own accord there are two contrary tendencies at work. On the one hand, originating quite outside science as a consequence of what might loosely be described as the running down of Western European imperialism, there is a centrifugal tendency away from continuing to use the existing major languages. In countries whose independent sovereignty is of recent date the use of local national languages for all purposes, including science at least on its applied side, is felt as part of the very stuff of exuberant nationhood, as an essential element in the ability to say 'we'. It is natural for the people concerned to expect that an efflorescence of their national life and culture will best be fertilized by using their own languages. Indeed this can scarcely be expected to occur unless the channels of thought are those which are native to the people who do the thinking. Educationally it may be unsound to make a foreign language the means of developing the capacity for thought. It is more or less consciously on such grounds as these that Israel, for instance, has modernized the Hebrew language for official (including scientific) use, and Indonesia has adapted and developed its form of Malay under the name of Bahasa Indonesia. Other examples might be quoted, the most extensive of course being that of India with its 357 million people (apart from the seventy-six million in Pakistan, now separate), where education at the lower levels is now organized in the appropriate Regional language (of which twelve are recognized and being systematically developed) but at the secondary and highest levels also in the Federal language (adapted from Hindi) along with English in order to impart the ability to read books in the latter.

Such is the official policy, but it is evident that English continues to be used more widely, and will continue to be used more permanently, in India, at the higher levels of science such as in reporting original research, than was contemplated immediately after independence. Thus in India and Pakistan the documentation centres called Insdoc and Pansdoc which Unesco helped to establish are called upon to make many hundreds of translations every year from a great variety of languages all into English, never into the Federal or Regional languages.

This illustrates how in India as elsewhere—including European countries even before the Second World War, as discussed by Professor J. D. Bernal in the first edition of his book *The social function of science*,[4] the centrifugal trend I have mentioned is more or less balanced by a centripetal one, in the sense that what he calls 'circles of scientific intercommunication' have become established which are based on the leadership of the greater industrialized countries of the world—circles whose membership is by no means confined to native users of the languages concerned. The German circle, he wrote in 1939, 'is or was far more closely knit than the others . . . so that professorships could be given indiscriminately . . . to any citizens . . . not only [of] Germany and Austria but most of Scandinavia, Switzerland and other Central European countries. The French circle once predominant in science is now shrunk in relative importance. Before the revolution, Russian science was a small subsidiary of German and French science but now its output greatly surpasses that of France . . .'.

On a more 'applied' plane than that which Professor Bernal had in mind, the same sort of thing may be seen happening. Thus in aviation English has become almost an international language; air pilots and everyone else concerned have to learn it in order to do their job. So do officers connected with Nato, for instance. But having mentioned that, this is a good point at which to interpolate a warning against identifying the word 'international' with 'common to the Western half of the world'. Before we lull ourselves with the assumption that English (particularly in its American variety) is automatically becoming a world language and that all we need do is to sit back and watch it happen, let us remember that on the other side of the iron curtain just the same thing is occurring, and is being actively stimulated with political force behind it, in Russian.

This brings us to the consideration of international auxiliary languages artificially constructed for ease in learning, like Esperanto. What are the prospects for one of these providing a solution to our problem? First of all, in order to soothe and ensure calm consideration by those who see in a natural 'ethnic' language a lovable thing with an ancestry and traditions behind it, with human eccentricities and something like a soul, to whom Esperanto or its likes may seem as repugnant as the idea of a baby originated in a test tube, the word 'auxiliary' (which its advocates, to do them justice, always prefix to the word 'language' when describing it) ought to be underlined several times and never allowed to be forgotten. But that is not the point. No one is suggesting we should use Esperanto for composing and singing love sonnets, or for bringing up children or for otherwise replacing our mother tongue in any way. The suggestion is simply that everyone besides being educated in his mother tongue should also learn this device for exchanging factual information and argument with foreigners, using a vocabulary which is largely international already and a grammar of the utmost simplicity stated in sixteen rules to which there are no exceptions, which can be learned in a few minutes off one sheet of paper. I can read Esperanto myself without difficulty, and understand most of it when spoken (the sound of it is quite attractive) though I have never devoted more than this amount of deliberate study to it.

My own opinion is that if we lived in a rational world an auxiliary international language, very easily learned, in which all science of more than local potential interest would be published, and which could be used on equal terms by everyone at international conferences, would be the solution. But we do not live in a rational world and we have to be realistic in facing the fact that esperantists in the course of nearly seventy years have not yet succeeded in persuading more than some hundreds of thousands of people, or at most a million or two, to learn it. Probably the reason for this is the vicious circle that until a larger number of people already know Esperanto there will not be a strong enough incentive for yet others to learn it. As has been well said, 'if you are to go to the trouble of learning a language you need to feel that you will get a return for your toil this very year. You want a vast and undelayed expansion of your contacts. The feeling that you are contributing in your small way to an idealistic but doubtful future is an inadequate motive. It is sad, but it is so'.

Esperanto is the oldest extant and most widespread of intended international auxiliary languages, with the largest network of associations spreading it and with several journals published in it. It is not however the only one. In fact several hundred have been suggested, most of them forgotten after a few years of advocacy by a few enthusiasts, but several surviving with an organized body of supporters and some sort of regular publication. One which seems to me to have special merits for scientific use, by reason of the philosophy on which it is based, is Interlingua.

On this question of there being so many candidates for the post of international language, both among natural ethnic languages and artificially created ones, an interesting proposal has been made by Professor Mario Pei who is a noted linguist at Columbia University, New York, in his book *One language for the world.*[6] The trouble which has hindered progress in this direction, he says, is that the protagonists of these languages have been trying to sell the world two things at once: the principle that *an* international language would be a good thing to have, and their reasons for contending that their own particular pet is better than the others. What he proposes, therefore, is the following sequence of steps: *i,* Induce *governments* to accept beforehand the obligation, after some one language shall have been agreed upon, to arrange for that language to be taught in all schools. *ii,* Hold a conference using a procedure designed to prevent any further time being wasted after the proponents and opponents of each suggested language have been given a set time to state their case, before proceeding to the vote by a succession of eliminatory ballots. *iii,* Leave an interval of five years to allow time on the one hand for any necessary trimming of the chosen language to make it suitable for international use (such as by phoneticizing its spelling) and on the other hand for teacher training. *iv,* Put the scheme into top gear, so that twenty years later everybody, in all the participating countries, will be able to intercommunicate.

Before leaving the subject of international languages let me remind you that mathematical, physical, and chemical science and some branches of engineering have a partial one already, in the shape of symbols which can be built up into formulae, equations, circuit diagrams, flow sheets, and so forth. In technology the British Standards Institution and its opposite numbers in other countries, as well as the International Standards Organization, are doing a lot to encourage uniformity in this respect, which is the only respect (apart from numbers and the conventional signs in maps) where Westerners adopt the Chinese principle of using ideographic symbols which directly identify the concepts to which we want to refer, instead of using alphabetical phonetic symbols which merely represent the noises we make when we talk about them, the noises varying from country to country. On philosophical grounds there is a lot to be said for that principle, which Leibnitz laid down three hundred years ago. Some years ago C. K. Bliss (not the American librarian and classificationist but an Austrian technical graduate who settled in Australia after working in China) worked out a complete system of ideographic writing and, with the encouragement of Bertrand Russell among others, founded in Sydney an Institute of Semantography to propagate it.

On the matter of improving and generalizing the ability of scientists to read foreign languages so as to reduce the need for translations I shall mention only a few points. First, a person who is well versed in some specialized subject has a great starting advantage, in language learning, over one who is not, because the meanings of specialized terms and statements in a text on that subject will often be more or less obvious to him from the context, symbols, and illustrations even if he has never seen them before and has no dictionary which gives them. However rudimentary his knowledge of the language as such, the technical concepts which he shares with the foreign author will act as stepping stones, not stumbling blocks, which he can feel with his feet even when they are submerged under the flow of foreign language. They will help him to understand the parts which are not so technical. That being so, the advice I would give any technical man who wants to improve his reading knowledge of a foreign language is to do what I did myself to improve my French and German when I was living by myself in the Malay jungle on an engineering job: subscribe to a suitable journal in the foreign language, as specialized and technical as possible and containing as many illustrations and symbols as possible. Do not rely on some journal being passed from hand to hand within the organization to which you belong but pay to have your own copy posted to your home. The point of this is that however busy you may be, the fact of its regularly arriving week by week will at least make you take off the wrapper and look through it, occasionally reading an article or book review or even just an advertisement, and then leaving it about so that there is a chance you will later read more.

Following much the same line of thought, it would be useful if Aslib or someone else would take the initiative of trying to re-establish the Engineers' German Circle which existed in London till 1939 and in starting similar societies for other languages (including Russian) and at other places. This had about one hundred members and at its meetings, held in the Institution of Mechanical Engineers, German engineers visiting London were invited to read papers about their work or on any technical subject, illustrated by numerous lantern slides. To make it easier for beginners they were asked to speak a little more carefully than they normally might in addressing their own countrymen, but all the proceedings, including the subsequent discussion, were in German. It was very instructive, apart from the fact that many of the papers had great technical interest.

I myself have hardly any experience in language teaching, but the Aslib report[6] contains a useful section on the results that can be obtained by specialized language courses for scientists. The Unesco report contains the germ of an idea which I have not yet had a chance to try out, but now put forward in case someone else would like to do so. It would constitute an exercise for technical language students at the same time as a means of reducing the translation work needed within an organization. The idea is this: take a foreign article and get students to translate it orally in class, using them as guinea pigs in order to make notes of the difficulties they encounter. Obtaining copyright clearance if necessary, have the article photocopied with a very wide margin. In this margin, type translations of the headings and of keywords and salient passages in the text, along with notes that might help a reader with only a slight knowledge of the foreign language to make out the rest—or anyway to see what proportions of it he can and cannot understand, and to decide whether he wants more of it translated. Mathematical or chemical formulae, and so on, and illustrations can of course be left untouched. The annotated photocopies can then be circulated to any potentially interested people in the organization.

If the scientific world cannot be persuaded to adopt one international language of publication, those scientists who do not want to lose the benefit of half the world's literature but who will not take the trouble of learning to read German, French, Dutch, Italian, Spanish, Polish, Russian, Chinese, etc., for themselves will just have to go on relying on translations. If one translating job has to await its turn among others, the process is apt to be slow as well as expensive. Its quality is governed by the fact (which seems obvious but is surprisingly often disregarded) that nobody can properly translate what he does not understand—for translation is not just a process of blindly looking up words in a dictionary and replacing one string of them by another; it involves seizing the sense and nuances of each passage which the author has expressed in the original language and then independently re-expressing that sense and those nuances in the target language. Therefore it has to be done either by one person who combines technical understanding of the special subject matter with awareness of the subtleties of the original language and with ability to write well in the target language, or else by two or three people who can meet these requirements by working together. Therefore it is necessarily expensive, because (apart from the fun of it, which is considerable) there is no reason why people possessing these combined skills should apply them to translating rather than to other professional work by which they might earn more.

The economics of it can be described very simply by the following example. If someone wants to make use of an article in a language he can read himself he can buy a copy of the periodical containing it for, say, three shillings or perhaps borrow it for nothing at all; if, however, a foreign article of five thousand words has to be translated for the sole benefit of one person, the cost on his behalf, at the Institute of Linguists rates which represent no more than a reasonable economic minimum from the translator's point of view, will be at least £15, which is a hundred times as much. Therefore it will not be worth while, from the consumer's point of view, to have that particular article translated unless he has reason to assume it will be worth a hundred times as much to him as anything which might be found available in his own language.

There are two ways of reducing the cost from what I have called the consumer's point of view without underpaying the supplier. One of them is not to make a complete translation in typescript of a whole article straight off, but to have a staff translator within the organization who, sitting with the person potentially interested in it, will orally and informally translate the gist of it and find out how much of it, if any, needs translating properly in typescript. This can be an excellent system, helping incidentally to improve the special subject knowledge of the translator as well as the linguistic knowledge of the person to whom the contents of the foreign article are explained. A tame linguist within the organization, perhaps with assistants so that he becomes the head of a service, can perform other useful functions also. He can give language lessons to reduce the need for translations (I know of a research institute in India where this is done). He can act as editor and organize team work in translating; and he can farm work out to freelances and agencies when there is too much to do internally or in the case of languages not provided for internally.

The other way of reducing the unit cost of translating is to spread the total by making copies of the same translation available to many readers, not confined to members of the establishment which has originated the translation. This requires considerable organizing, but it also saves duplication of effort through several independent translations being made of the same foreign text. Both the Unesco and the Aslib reports deal with this point. If the probable readership is big enough the translations can be printed either from set type or by photolitho and the thing becomes a publishing venture like any other. Books which have been translated are listed in the big *Index Translationum* issued annually by Unesco giving bibliographical details of about twenty thousand translations published in the previous year from and into about one hundred languages, grouped under the ten main classes of the Universal Decimal Classification (including 5, Natural Sciences and 6, Applied Sciences), and fully indexed. This does not, however, mention translations of articles in periodicals which, as we all know, make up the largest and most important part of scientific literature. As regards Russian, there has been a very considerable development in the last fifteen years of what are called 'cover-to-cover' translations into English of each number of a particular journal, as discussed and listed in the Aslib report.

There are almost no cover-to-cover translations except of these Russian journals, but there are several ways by which copies of translations existing only in typescript can be made available to anyone who wants them. One of these is exemplified in the Commonwealth Index of Scientific Translations started in 1951. Each country co-operating in this has an appointed agency which collects details of translations of articles and reports made by organizations in that country and sends them to the British Commonwealth Scientific Office in

London. The latter transfers the references, in a standard form, to stencils from which index cards are run off and distributed to all the agencies in fortnightly batches, totalling about one thousand references a year, enabling the agencies to tell inquirers what translations of articles and reports are available—of which copies can be had on application to the holders of the originals, wherever these may be. In the United Kingdom the agent is Aslib, which has adopted the useful practice of temporarily adding coloured cards to the index in reference to translations notified to it as having been ordered but not yet as completed, thereby considerably reducing the time-lag of several months during which there existed the risk of duplication. The makers of translations in this country contributing to the Commonwealth Index include establishments of the Department of Scientific and Industrial Research, research organizations affiliated to it, the Ministry of Supply, and some industrial firms.

The Unesco report also gives particulars of other translation pools and indexes existing in the United Kingdom, the United States, continental and other countries—a 'pool' differing from an 'index' in that not only references for searching but master copies of the translations themselves are centralized at one point, from which a full-sized or microfilm reproduction of any desired item can be had direct on application instead of having to obtain it from the originator of the translation. The European Translations Centre at Delft (Netherlands) does this on an international scale and is linked with other services such as a Foundation for Scientific Literature Difficult of Access.

Up to this point I have discussed the surmounting of language barriers only in regard to primary publications—those publications which are themselves the vehicles of scientific information. As we all know, the volume and variety of these is so overwhelming that a vast apparatus of secondary publications, meaning current bibliographies and abstracts, has had to be developed alongside it with the object of supplying awareness of the existence, relevance, and location of primary publications potentially of interest. Most of the abstracting journals which do this for their respective fields of science cover not only domestic publications but foreign ones in a wide variety of languages. Abstracting from a foreign language is a different art from full translating. Among the qualities required for it the emphasis must be on judgement, based on familiarity with and up-to-dateness in the special subject matter. It is not as a rule desirable to translate abstracts, as such, from one language to another without the translator being able to refer back to the original publication abstracted.

A few words now on the prospects for translating by machine and the question whether this possible technique needs to be taken seriously. Its application to practice is not yet a reality but its working principle is. To summarize this in a single sentence, let it be said that an electronic computer (so called because first applied to mathematical operations) is a device which can be 'programmed' in such a way that when a particular sequence of signals is fed into it—in this case signals corresponding to words of language A spelled out on a typewriter-like keyboard—the machine emits a predetermined sequence of other signals, in this case impulses which cause corresponding words of language B to be automatically printed. If that were all we should have a mechanized dictionary. But it is not all. The programming can be such as to cause the machine, before thus translating any given word of A, to search the rest of the sentence or text fed into it and adjust both the translation of that word and its position in the sentence according to the proper usage of B. To give a very elementary example, it is made to put adjectives which usually but not quite always come after the nouns in French before the nouns in English—again usually but not quite always, as exemplified in 'court martial'. It is also made to decide between multiple meanings, either from the adjacent words (*boîte de savon* = box of soap, *boîte de nuit* = night club) or from the remoter context (*le temps* may refer either to the time or to the weather). In languages which require this it applies case-endings to nouns, takes account of gender, conjugates verbs according to tense, mood, and number. It can be made to substitute the aptest instead of the most literally corresponding idioms and proverbs. If this were considered worth while, it could even be made to distinguish the gynaecological statement 'she cannot bear children' from the psychopathic one 'she cannot *bear* children'. The machine can be 'taught' an unlimited complexity of rules, exceptions to rules, and exceptions to the exceptions. Unlike the human pupil, it will 'remember' and go on rigidly obeying all these instructions for ever, unless later they are cancelled. The only theoretical limit to its capacity is the ability of the linguists who do the programming to analyse and codify not only the terminology but all the grammatical, syntactic, and idiomatic subtleties of each of the two languages.

But the machine will do all this blindly, without ever the faintest gleam of common sense. It is another test-tube baby. If its programmers have done their job thoroughly enough, it should be able to make translations which are informatively correct; but it can never make value judgments, never 'feel' that one rendering of a sentence would be 'better' than another. Therefore the nearest it can ever get to 'style' will be aptness in the choice of clichés. But there is nothing to stop having the style improved afterwards by a human editor; he need not know the source language, but merely have a 'feeling' for style in the target language.

For these various reasons I cannot myself see much of a future for machines in literary ('imaginative' or 'aesthetic') translation, anyway not in the commoner languages which there are plenty of human translators able to undertake. But I do see a possible future for them in the 'functional' or 'pragmatic' translation of highly specialized subject matter in unusual languages which occur only occasionally, for the sole purpose of extracting information, like the thirty or forty languages which the Commonwealth Agricultural Bureaux have to cope with, and for which translators are not available at every street corner—always provided that the economics of the case are favourable.

The governing factors in the economics of machine translation, assuming it to be satisfactory technically, I imagine to be these. The capital cost of a computer is enormous and probably can never be justified for occasional use in translating only; but where a computer is already installed for accounting or statistical or other data processing purposes in the same establishment, or machine time can be hired, an occasional hour of it may not be out of the question for translating. The programming (by collaboration between linguists, subject specialists and computer experts) would also take a long time and be costly, but this too is a capital cost needing to be incurred only once in respect of each language, after which tape records of program instructions (with supplements embodying the special terminology of each technical subject) could be reproduced and sold to anyone, in any part of the world, who had a computer to feed them into, thus spreading the cost.

Assuming all this, the main item of operating cost apart from hire of machine time would presumably be copying the original foreign text into the machine. Not many copy-typists are capable of perfect literal accuracy in a foreign language they do not know—and here such accuracy is essential, failing which the machine, having no common sense, will not be able to recognize the words it is called upon to translate. (In translating from English, for instance, it would not know, unless someone has thought to tell it, that the American 'aluminum' means the same as the British 'aluminium'.) I imagine that the worthwhileness of machine translating might hinge on this item of cost, and wonder whether the answer would be to have the input text prepared in the country of origin where the typist who did it would be working in her own language—or even to have it done on a tape in an attachment to a typewriter or typesetting machine whereon the original text was being recopied in any case. One can imagine publishers of journals offering tapes for sale, prepared in this way, of any wanted article. But it would need a bit of organizing.

Another way of eliminating the copy-typist, which is at least theoretically conceivable and is in fact now an object of research, is a character recognition device—that is, an optical machine which would automatically 'read' the original printed or typewritten text and feed it directly into the computer which did the translating. But if that becomes a working reality it will have to be something sophisticated, considering what a variety of styles and sizes of types there are.

A bare mention must be made of the essential role played in scientific and technical translating by proper regulation of the terminology. Ideally all technical terms should be standardized on the basis of internationally agreed definitions and it should be easy, on referring to a dictionary, to find for every expression in language X a corresponding expression in language Y which had precisely the same meaning and implications, no more and no less. We are very far from that position and, therefore, from being able to use technical terms as tools of precision, even apart from translation. But various international organizations concerned with technical subjects, as well as national standardizing associations affiliated to the International Standards Organization, are working towards that end and an account of their efforts will be found in the chapter on terminology and lexicography in the Unesco report. Unesco has also published bibliographies of existing 'interlingual scientific and technical dictionaries'[1] and existing 'monolingual scientific and technical glossaries'[7] containing definitions of technical terms, classified by subject.

Terminology is not, of course, the whole of language; but it might be said that technical terms bear the same relation to scientific writings and translations as the contents of a builder's yard do to architecture: unless they are properly standardized the job you can do with them is impaired.

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DISCUSSION *

Dr D. J. Campbell (Pressed Steel Company Ltd) pointed out that Esperanto was not a *world* auxiliary language; it was Europe-orientated. Ideograms, he said, were not a good medium for abstract ideas. Dr Holmstrom agreed that the terminology of Esperanto was not international, and added that Interlingua was statistically better than Esperanto; but he preferred Esperanto, because, though less scientific, it was more widely known. Ideograms, he insisted, could convey abstract ideas perfectly well. That was what symbolic logic did.

Mr R. Sewell (United Steel Companies Ltd) discussed the long-term and short-term aspects in teaching and learning languages; 'crash courses' organized on army lines had their uses (mainly for brushing-up) but a follow-up was essential. He said that Chinese ought to be taught to twelve-year olds.

Mr L. J. Anthony (United Kingdom Atomic Energy Authority, Culham Laboratory) pointed out the practical consequences of not being able to deal with foreign languages; in the United States 90 per cent of the references used were American, in the USSR 40 per cent were Russian.

Mr A. R. Longley (ICI Heavy Organic Chemicals Division) and Mr K. G. B. Bakewell (British Institute of Management) agreed with Mr Sewell that managers had an over-optimistic attitude to easy language learning. They stressed the need for co-operation between the subject specialists and the translator. Miss M. F. Webb (Patent Office) endorsed the value of viva voce translations and said that possibilities of a panel of viva translators for the National Reference Library of Science and Invention were being explored. Dr Holmstrom agreed this was a useful system.

Mr A. Granville Prior (National Union of Teachers), discussing the teaching of Chinese, said it was not possible to supply enough teachers of Chinese and Russian in the United Kingdom. Mr B. C. Vickery (National Lending Library for Science and Technology) made the point that one must ask if the material to be translated was valuable; otherwise, why should management be interested in translation. The National Lending Library *Translations Bulletin* tried to make public what was published in foreign journals. The National Lending Library was trying to find out whether the 'cover-to-cover' translations were more useful than selective translation services. Mr A. H. Holloway (Admiralty Centre for Scientific Information and Liaison) said that in making translations, a knowledge of jargons was not enough. Subject knowledge was also necessary. Mr E. D. Wiggins (Fisons Ltd) urged the importance of having teams of translator/abstractors; Dr Holmstrom endorsed this.

Mr V. Biske (Lobitos Oilfields Ltd) added that it was time-saving to record translations orally on tape. Dr Holmstrom said that in his experience the quickest and best way of making a full translation was to dictate an outline draft onto tape (saying 'blank' or 'blank line' when he came to symbols or to an expression or passage that needed thought or research) and to have the transcript of this fair-copied after he had improved and completed it by hand.

* Another point raised in the discussion was that of the practical consequences from missing foreign material through its not being available in translation. The author would say that those consequences are probably important, but are difficult to assess for the simple reason that nobody knows just what he is missing—though he might be able to get an idea by scanning and counting the proportions of items in those bibliographical and abstract bulletins that have a world-wide coverage.

MONITORING CURRENT TECHNICAL INFORMATION WITH THE BRITISH TECHNOLOGY INDEX

E. J. COATES, F.L.A.
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36th Annual Conference, Blackpool, October 1962

INTRODUCTION

INDEXING is an activity in the performance of which a sense of aims and objectives may easily be blurred by one's over-immersion in technicalities. This is a great pity because preoccupation with the technicalities is right and proper, is indeed the outcome of many lacunae in indexing technique which need further inquiry. It is, however, necessary at the very beginning of an indexing project to try to offset this risk, by sorting out the mixture of objectives to which the index is directed, to arrange them in a preferred order of importance, and then to proceed to apply the resulting scale of values.

From the point of view of commending the *British Technology Index,* it is unfortunate that I have to draw attention to a scale of values, because it implies that the *Index* does some things more satisfactorily than others. This is thoroughly unsound as a promotional tactic, which I am compelled to adopt only because I see no other way of offering the required explanation. I hope that the inference will not be drawn that I can afford to be indifferent to the question of support for the *Index* by libraries which do not at present take it. If I may give you a very brief indication now on the volume of support obtained, and that still required, I may say that the *Index* has reached its planned target of one thousand subscriptions. This means that it is approaching economic buoyancy. It could arrive there with the help of potential new subscribers present at this session.

INDEX DESIDERATA

The three attributes which determine the utility of a bibliographical index are the extent of its coverage, its promptness in publishing index entries of the material covered, and its retrieving power. This represents in a general way the underlying value order which goes into the making of the *British Technology Index*. Our object is to cover the four hundred listed British technical journals, to print index entries relating to this material as promptly as possible for monthly publication, and within the framework of these two prior requirements to make the *Index* as effective a retrieving mechanism as can be devised.

COVERAGE

To begin, then, with the question of coverage. The *Index* has been criticized because it is limited to British sources. It is said that country of origin is an entirely non-significant attribute of technical information. It is true, of course, that a world index would be of immeasurably greater value than a national index. Despite some suggestive thinking by Bennett[1] on the role of computers in the production mechanics of a global index, a world-wide index is simply not in sight at present, and it therefore seems to me that any limited project giving retrieval of part of the total output is worthwhile. The argument based on the universality of knowledge is not really relevant. The fact is that for the same expenditure you can cover much more material and publish the entries far more quickly if you take the output of a single country covering a wide field rather than the world output of a relatively narrow field.

I do not know upon what principle one would set about choosing four hundred from all the technical journals published in this country. During 1961 the BTI Planning Committee, in circularizing libraries on the question of support for the BTI, asked for suggestions as to journals which should be included, and the list with which we are working is substantially the result of those suggestions. The nucleus of the list was first drawn up by the Planning Committee, this was then augmented by titles suggested by two or more libraries, and to the editor fell the final task of selecting only about twenty further titles from a number of suggestions each made by one library only. I think therefore that the list must be as fair a representation of the views of users as it is possible to secure. These were, of course, preliminary views before the publication of the *Index,* and the appearance of the *Index* could conceivably result in their modification. I myself have doubts as to the utility of a few of the titles which we include, but as they have evidently been thought useful by some users of the *Index,* we should not be too precipitate in removing them. The list is in any case reviewed every six months, to give us the opportunity to consider worthwhile new journals. I am, on the other hand, reasonably satisfied that our list covers a high proportion of the more important non-monograph papers published in this country.

It was well appreciated at an early stage in planning that a project of the size contemplated would not index all the articles contained in the four hundred journals, and it was left that the editor should select 'substantial' articles, the entries and references to which would occupy about one hundred pages of print per month. An attempt was therefore made to extrapolate from the chosen list of journals itself some more definite idea of what was meant by 'substantial articles', on the assumption that every title must carry some examples of what, in the view of the person who suggested them, were 'substantial articles'. It soon became apparent that the *Index* was meant to carry not only articles embodying the results of original research, but also derivative articles—varying from the kind which does a signal service in unravelling a tortuous and obscure original, to the article which is patently a rehash. It appeared also that the *Index* would include a certain amount of advertising matter in more or less penetrable camouflage, and a certain amount of news material of an informative character. In view of this and of the diversity of the users of the *Index* it was evidently not going to be feasible to apply purely evaluative criteria in selecting material for indexing.

This necessarily rather cursory survey of the contents of the journals also underlined the need for maximum clarity in defining just what the subject field of the *Index* was to be. On advice from libraries in the medical and agricultural spheres it had been decided to exclude material from these fields. This left us with Engineering, Chemical Technology, and the various manufacturing techniques based on either one or both of these applied sciences, as our core subject field. The question of which peripheral subjects are to be included was much more difficult, because the logical boundaries, none too easy to decipher in themselves, are yet harder to translate into terms of practical selection of articles. What we have tried to plot are clear rather than logical lines to delimit the scope of the *Index*. We have, for example, attempted to stabilize the Science-Technology frontier problem, as far as it concerns the *Index*, by including articles on the pure science (that is the physics or chemistry) of particular man-made objects, even when these have, as yet, no practical application. Thus we would include in the *Index* an article on the latest solid-state laser, but not one on the statistical mechanics of optical pumping. We think that this demarcation line is as clear as any line can be in this area, and will be readily understood both by users and the indexers themselves. The other subject areas marginal to the central field of the *Index* are Economics, Management, and Applied Biology. We had hoped to include all articles in the journals on the economics of particular industries, but we found that there was so much of it as to endanger the specifically technological character of the *Index*. We have therefore been forced to restrict the material included to articles with a mixed economic-technological slant and those dealing specifically with the interaction of economic and technical factors. In the borderland between Technology and Management the *Index* covers articles dealing with the more sophisticated applications of the techniques of engineering and mathematics to Management. Topics such as Operational Research, Work Study and Ergonomics are included as distinct from material representing the more traditional approach to Management problems. On the side of Economic Biology, the most important subject which bestrides the boundary is Food. Food processing and preservation is clearly within our field, and we also cover the chemistry of food substances, but not their physiological chemistry. A similar dividing line is observed in our inclusion of material on pharmaceuticals, fertilizers and pest control preparations.

When we have omitted articles which fall outside the BTI subject field, the four hundred journals still contain perhaps three or four times the number of separately headed items that the project is able to handle. Many of these items are snippets, slight in themselves though often of informational value to someone. BTI caters for a variety of users with varying subject interests, and any attempts at evaluative selection of material would involve setting up a relative value or importance scale for various classes of users. I am sure that it would be quite wrong to attempt this. Furthermore, the interlocking of subject interests is so complex that there is no hope of being able to relate particular topics to particular classes, or numbers, of users of the *Index*. Administratively, any worthwhile valuation process would require some form of retrospective comparison of articles before it was decided what to publish. Given the present size of the project, this addition to routine would necessitate reducing our list of titles covered, by a factor of at least three; and it would still be doubtful if we could maintain the present brevity of time-lag between original publication and published index entry. For all these reasons, and also because of the inherent difficulty of maintaining consistent value levels over a great range of subjects, evaluation of individual articles is not a feasible method of selection for indexing. It is, however, possible to reach views about the relative informational content and value of various formal categories of material found in the journals which most people would agree are likely to be, at any rate statistically, valid. The advantage of such an approach is that it avoids value discrimination between different subjects and subject interests because the formal categories are spread over all subjects. In the summary you will notice a list of these formal categories of material which are at present excluded from the *Index*. They are articles of less than a specified length, at present one page text and/or diagram in the usual format and typography, letters, discussions, notes, brief resumés of symposia, regular miscellany features covering a variety of topics, and enumerative descriptions of several products, including accounts of exhibitions. The philosophy here, riddled with exceptions and reservations though it must be, is that the longer article will on the whole have more useful informational content than materials of the excluded categories just named. Again, I must mention the administrative advantages of such a method of selection. It can be delegated easily, as a process it is swift and inexpensive, it operates with consistency, and it can be adjusted within concrete limits if circumstances demand a change.

CURRENCY

I pass now to the second useful attribute of the *Index*, namely its promptness in publishing entries, or more specifically the time-lag between the date on which an article is published and the date on which its entry appears in the published *Index*. Despite some initial hitches in the regular supply of journals and despite being short-staffed for the first six issues, more than nine-tenths of entries have appeared within seven weeks of original appearance. The briefest possible publication-to-index interval is three weeks and it does seem probable on present performance that we shall very shortly reach the position in which all entries will be printed within seven weeks of original publication, apart from most exceptional circumstances. In this single factor of currency, perhaps more than any other, lies the chief justification for the existence of BTI. Apart from what the new *Engineering Index* monthly service may possibly achieve, no abstracting service that I know of approaches this brevity of time-lag before the appearance of subject signposting. *Nuclear Science Abstracts* with a publication-to-subject index interval of about three months is exceptionally prompt as abstract subject indexes go. If a subject index is provided at all, one usually waits until the end of the year, and I need not remind you that the most famous of all abstracting services has so far not subject-indexed material published after 1960. BTI therefore sees this filling of the gap between publication and appearance of subject-index to abstracts as its chief service to information retrieval; and other desirable factors, such as typographical elegance, consistency and accuracy of transcription, comprehensiveness of connective references, are consciously subordinated to the overriding need to get the article recorded within seven weeks of appearance. The seven-week maximum time-lag is possible because we are using non-conventional printing techniques which permit the preparation of master copy for eventual litho reproduction concurrently with actual indexing. There are hazards connected with this technique, which places a very high premium on accurate physical handling of unit-line copy and which does not allow for the degree of editorial hindsight which is possible with a letterpress galley proof. We do, however, accept these drawbacks as the necessary price of speed of production.

RETRIEVING POWER

a. Specificity. Third in the scale of value-attributes of BTI is what I have called its retrieving power. Any list of titles has, of course, retrieving power in so far as it can be sequentially scanned. One can, by carefully examining every fragment in the haystack, eventually find the needle. This takes a lot of time, but the more critical difficulty is that not all haystacks contain needles. One may have used a lot of time to no purpose. This is the real reason why the effective retrieving power of an index is among other things in inverse ratio to the amount of sequential scanning demanded of the user. Sequential scanning always involves the risk of the needleless haystack. The more sequential scanning there is, the bigger the potential waste of effort, until the risk becomes so great that the search is just not worth undertaking unless the practical issues depending upon the search are enormous. BTI is designed to minimize sequential scanning by the use of headings which are specific—co-extensive with the actual subject of the article, or nearly so. I have to admit the qualification because the language of subject headings loses intelligibility when carried beyond certain lengths, unless one is prepared to insert symbols denoting relationships between the various elements of the subject heading. This we were not prepared to do, because we know from experience that however willing our prospective clients may be to accept innovations of many kinds, they will certainly draw the line at a new set of symbols. So our comma between heading elements has to bear many meanings, and therefore our headings are not always as specific as they might otherwise usefully be. Nevertheless the BTI manages to be more specific than most indexes to periodical literature.

b. Entrance terms. Another factor with an important bearing upon retrieving power in an index is the number of entrance terms used. Basic economics usually imposes what seems an agonizing choice between more short references from the subordinate subject elements, or fewer added entries from a restricted selection of these subordinated elements. But in fact the choice is not really agonizing; clearly if retrieving power is our object we must provide a maximum number of sought entrance terms (involving, if need be, indirect reference procedure) in preference to fewer entrance terms attached to direct entries. The high proportion of references to headings in the BTI is the outcome of this point of view.

c. Synonym control. Care in avoiding the use *as headings* of terms of equivalent meaning is a substantial virtue in any index. I will not say that it is exemplified one hundred per cent in BTI, but for beginners, the lapses have been few. They are avoided by the liberal use of referencing from synonyms, and more especially because the staff are encouraged to think of subjects, not only as verbal entities, but also in classificatory context. Two words which bring you to the same specific classification position will necessarily be synonyms.

d. Subject-heading language. I turn now to a matter of the greatest importance for the retrieving power of the *Index*. This is that the *Index* shall be predictable in the manner in which it turns the ordinary language of statements into subject-heading language. You will appreciate that new subjects loom so large in BTI's operations that the concept of following someone else's standard list brought up to date at relatively infrequent intervals is quite unworkable, unless we are prepared to accept a great reduction in retrieving power. We have therefore to construct headings to meet the multitude of new topics as they arise. The new subjects, more often than not, turn out to be new combinations of old concepts, and the problem of their predictable handling is a matter of consistent subject-heading syntax. There is no corpus of theory on subject-heading syntax, but there is a straggling history of intuitive fragments and rules of thumb, formulated by practical indexers such as Cutter,[2] Kaiser,[3] and Ranganathan.[4] We draw upon these extensively in BTI practice. We have also been influenced to some extent by the views of Farradane[5] on relational analysis. Such rules for subject-heading syntax as we have so far devised are necessary both from the point of view of predictability by the user, and for economical staff working. They permit the rationalization and delegation of what would otherwise be an impossible burden of individual decisions. They have also a great deal to do with the speed at which we are able to handle the intake. The following are examples of syntactical rules of commonest application in the BTI:

1. ANYTHING	ITS PROPERTIES	
GRAPHITE	*, Strength*	
2. ANYTHING ACTED UPON	THE ACTION	
YARNS	*, Dyeing*	
3. ANYTHING ACTED UPON	THE ACTION	THE INSTRUMENT
METALS	*, Forming*	*, Magnetic pulse*
4. AN INSTRUMENT	ITS ACTION	
DIAMOND	*Honing*	
5. ANYTHING	ITS KIND OR TYPE SPECIFIED	
STEEL	*, Mild*	
6. TYPE OR KIND SPECIFIED BY FUNCTION	ANYTHING	
PRINTING	*, Inks*	
7. ANYTHING	ITS COMPONENT OR SUB-SYSTEM	
AIRCRAFT	*, Engines*	

The left-hand column gives the entry word or main heading, the remaining two columns give the subheadings. The word 'Instrument' in the third has the grammatical and not the technological sense. You will observe that the compound subjects are analysed both from the point of view of Categories (such as Thing, implied in the word Anything) and from the point of view of Relationships between the various elements in the heading (implied by the preposition 'upon' and the genitive 'its'). These types of headings are related in a simple way to natural language. If we take examples 1, 2, 3, 5 and 7 and examine their equivalents in the language of statements we have:

1. Strength of graphite
2. (Someone) Dyes Yarns
3. Magnetic pulse Forms Metals
5. Mild Steel
7. Engines of aircraft

All that has happened is that the subject headings have reversed the natural language order of the verbal elements in the equivalent statement. This simple relationship makes the rules easy to apply. Most bold headings in the BTI are of these types 1, 2, 3, 5 and 7, and in these cases, by reading the terms from right to left, and if necessary supplying prepositions to replace commas, you find an intelligible sentence. The less frequently occurring cases 4 and 6 retain natural language order when read left to right.

These rules cover quite a high proportion of subject-heading problems. They perhaps look unconvincingly simple for the task they have to perform. It must be remembered that in practice they are often combined. Having for instance first sorted out at 5 such a compound as Mild Steel, we can then treat it as a whole, as Anything at 3, and it can be followed by an action term and an instrument term. Alone or combined, they cover a high proportion of the problems met by indexers. Their general effect is that under the heading for a Process only generalities relating to the Process are represented by entries with bold headings. The applications of the Process are, however, listed by means of thin-type inversion references, which direct the inquirer to entries under the Application. I make no claim for the rules, except that they do give definite answers to most of the problems, that they yield answers to a consistent pattern, and that on the whole they give subject headings which correspond to the way most inquirers can be expected to look at these matters. I know that in Technology a case can be made for making main entry under Process rather than Application, and for an index or library catalogue specializing in a particular field within technology I think it is a very strong case. However, for an index covering the whole of technology, designed among other things to facilitate inquiry across subject-field boundaries, it does seem to me that the choice should fall on Application, if it is a straight issue between this and Process.

e. Inversion references. I have just mentioned inversion references, and I should perhaps say a word about these. They are derived from the bold headings read right-to-left, and for economy they are constructed chain fashion. To take example 2 we have inversion references: MAGNETIC PULSE, Forming, Metals. See METALS, Forming, Magnetic pulse, and FORMING, Metals. See METALS, Forming; but *not* FORMING, Magnetic pulse, Metal.

Not all subheadings are referenced in this way. Some terms of very wide application such as 'production', 'research', 'components', 'reaction', are clearly never likely to be sought as such by any user. The function of the inversion references is of course to help the inquirer who approaches the subject complex by some other word than the one chosen for entry word. They also perform an important linkage-function, which is perhaps not quite so well understood. To illustrate this by a concrete example, let us imagine someone looking for material on Tufted Textiles. He looks up TEXTILES, Tufted, but this is not in fact the only relevant material in the index. To discover the additional material he looks in the index under TUFTED, and finds a reference there not only to TEXTILES, Tufted, but also to CARPETS, Tufted, which is possibly relevant to his problem, and which he would not otherwise have located.

f. Other indexing problems. There are, of course, a number of other subject indexing problems, over and above those which can be solved by syntactical rules. Of particular difficulty is the question of the nearly pervasive property, the term for which is usually or often omitted in the literature. An example is FUSION WELDING. Nearly all welding is Fusion Welding so that the term fusion is rarely used in the literature except when someone wishes to talk about cold welding. A great deal of literature on computers is on digital computers. Nearly all the literature on corrosion is about the corrosion of metals. Should we therefore always include the unstated term, at the cost of long headings and a pedantic appearance, or do we leave them out and accept the occasional blurring of useful distinctions? A further problem concerns the selection of preferred synonym for headings. I think here that our choice of preferred term initially will be biased by the usage in the first one or two articles we handle on the subject. I do not think this can be avoided altogether without putting our currency target right out of reach. From time to time we shall probably have to review, and, if need be, amend headings to conform with BSI definitions and preferred usage. It is unfortunately one of the hard facts of life that a current index can conform to less frequently published standards only by retrospective amendment. On-the-spot decisions must be taken largely on the usage in the material which we have in hand.

USE OF THE BTI

I want now to deal rather more directly with some characteristics of the user, in particular the industrial user, of the BTI. This undoubtedly idealized personage has, of course, been an implicit target in all levels of planning, design and execution of the project. First I would like to consider him as an individual, then in an organizational context.

Markus,[6] in discussing index quality problems, makes the point that an index perfect for one type of user may be almost worthless for another. The alphabetical form of the BTI is suitable for the needs of the user who is interested in a narrow field, or a number of narrow fields or in answers to specific problems. It is not worthless for broad field survey, nor for browsing or collective inquiries, but it is laborious for these purposes. The decision of the Library Association to opt for the alphabetical form reflects the view that the need for a tool to deal with narrow field inquiries is actually greater than that for a broad field retrieval tool. Undoubtedly both needs exist, but no user reaction received so far suggests that the basic assessment was in error. One thing we cannot do is to cater for both kinds of inquiry by the alphabetical system: in attempting to do so we should fall disastrously between two stools. We must live with the fact that alphabetical form is awkward for broad field survey, that it is actually used for broad field survey only because in many fields no equivalent classified service exists.

Let us then confine our attention to the inquirer in the narrow subject field. Who is he? Ultimately he is someone in management, research, or production supervision, seeking information which is too recent to be found via subject indexes to abstracts. According to the size of organization in which he functions he may or may not delegate the search task to a librarian or information officer. In view of the correlation between information departments and the value attached to technical information, it is likely that the person actually handling BTI will be a librarian or information officer in most cases. This is, however, a matter of convenience and not inherent necessity. Anyone can handle BTI and in fact it is sold to small firms without separate information departments. There is no system to be mastered in advance. Scott,[7] in his report on the use of technical literature by technologists in the electrical industry, points out that most reading of technical literature is for the purpose of primary stimulation rather than for information search. Whether this is because the literature is inherently incapable of answering technologists' questions, or because the educational system conditions technologists that way, or because the routes to the information in the literature are relatively long, hazardous, uncertain or non-existent, we do not know; but as processors of information our particular concern must be with the last factor, whatever its relative importance against the other two. It is hard to imagine that any index has ever 'primarily stimulated' anyone, but I think that there is a middle activity, between primary stimulation and specific searching, the neglect of which is critically dependent on the lack of published indexes. This is what I might describe as 'keeping tabs on' or 'monitoring'—the regular brief systematic surveillance of what (if anything) is currently going on in a narrow subject sector of particular interest. This activity, of immense importance for general awareness, languishes or is done at unnecessary cost and effort, for lack of the right kind of index tools.

The character of the organization to which the inquirer belongs, its size, and the degree to which it has developed information services, naturally has a marked bearing on the extent to which he will use BTI. There are, loath as you may suppose I am to say it, libraries which put up a better performance than BTI both in respect of speed of indexing and detail. Naturally BTI will not replace any part of the indexes in such libraries. I think it has a place in these top-quality services, but on another count to which I shall come in a moment. Where the BTI service and the individual library's indexing are about equal in quality, then there seem to be three considerations which determine whether BTI is used as a substitute for part of the existing service. These are the economics of doing it yourself as against the cost of the outside service, the administrative untidiness of divided index facilities, and finally the question of slant. The BTI indexing slant appears to suit some libraries but not others, and I have not yet been able to form any coherent pattern of the reactions I have received about this. In addition there are, of course, all sorts of extraneous reasons why, in a particular case, it might be desirable to shed part of the indexing burden on to the published service.

In other cases where the library's own indexing is, for one reason or another,

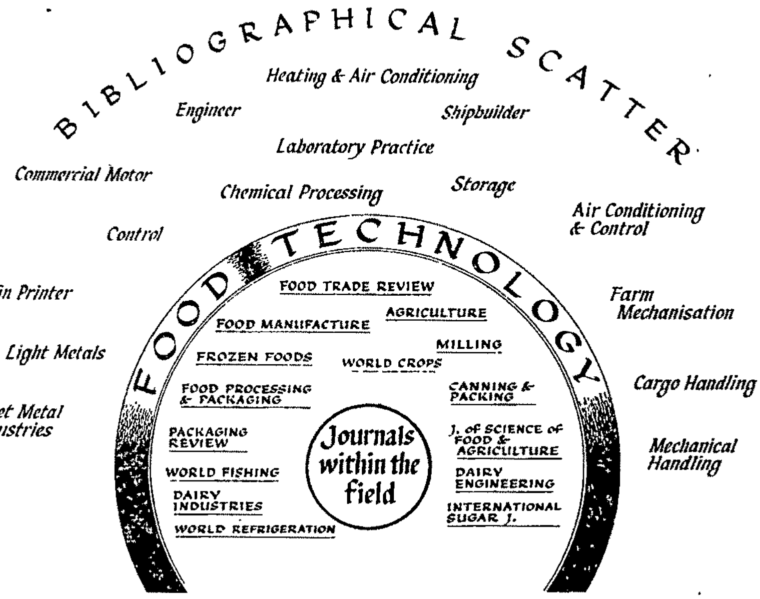

FIGURE 1. *Sources of information on food technology recorded January/February* 1962

less full or prompt than BTI's, it seems to me that the argument for using BTI as a supplement to one's own indexing becomes overwhelming. I would include in this category most libraries handling specific subject queries which have a UDC classified index, but no really adequate alphabetical key to complement it.

What I have said so far might suggest that the better developed and larger libraries have less use for BTI than those which are smaller, perhaps newer and still making their way. This is true up to a point, but there is one problem, reaching even into the upper echelons, to which BTI forms a very useful answer, as far as British sources are concerned. This is the question of fringe or peripheral subjects, and the difficulty of keeping up with potentially relevant material. The President of Aslib[8] spoke earlier this year of the ever present danger of remaining in ignorance of advances in subjects which have profound effect on one's own. I think his warning was perhaps given in a pure science context, but who shall say that the point is not equally applicable to technology. For this purpose gossip and personal contact are probably ineffective as information-transmitting media, and it is here above all that bibliographical tools come into their own. The fringe subject problem is, of course, the outcome of the erosion of subject field boundaries, which scientific and technological change is itself bringing about, and another practical consequence of this phenomenon is the bibliographical scatter of sources of information, not only for marginal subject material, but of material belonging to core subjects as well. It is becoming increasingly hard for information workers to know the unlikely places in which material of their speciality may be found. The diagrams illustrating

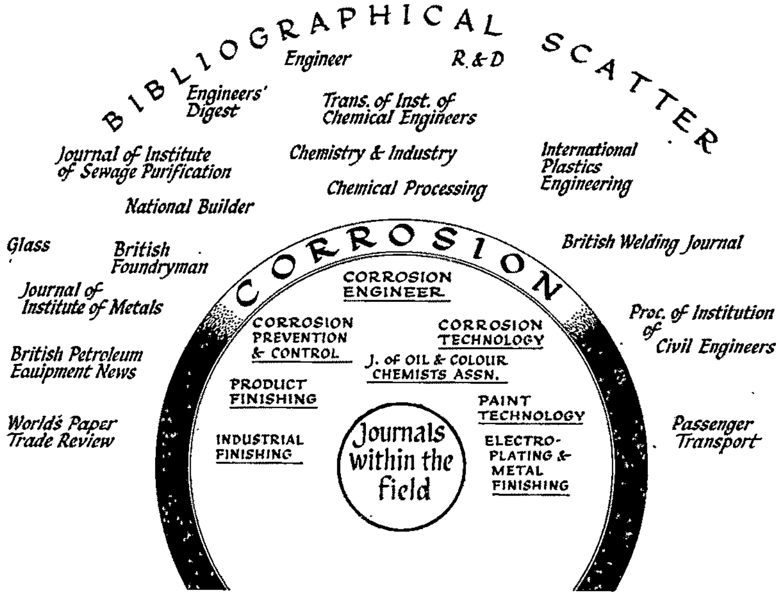
BIBLIOGRAPHICAL SCATTER
Engineer
R.&D
Engineers' Digest
Trans. of Inst. of Chemical Engineers
Journal of Institute of Sewage Purification
Chemistry & Industry
International Plastics Engineering
Chemical Processing
National Builder
Glass
British Foundryman
British Welding Journal
Journal of Institute of Metals
Proc. of Institution of Civil Engineers
British Petroleum Equipment News
World's Paper Trade Review
Passenger Transport
CORROSION
CORROSION ENGINEER
CORROSION PREVENTION & CONTROL
CORROSION TECHNOLOGY
J. OF OIL & COLOUR CHEMISTS ASSN.
PRODUCT FINISHING
PAINT TECHNOLOGY
INDUSTRIAL FINISHING
Journals within the field
ELECTRO-PLATING & METAL FINISHING

FIGURE 2. *Sources of information on corrosion recorded May/June* 1962

this (on this and preceding page) are not specially selected cases—the subject of food in particular is very nearly marginal to the BTI field, and of course the scatter shown there gives only the spread so far as it occurs in the BTI field. The intensity of this problem varies for different subjects, but we think its control in many special libraries large and small should be among the more generally useful services rendered by BTI.

If there is one lesson I have learned in the last year, it is that one must never generalize about special libraries. There are, I feel sure, many other situations in special library practice to which this *Index* is the part answer. It is regrettable that by virtue of its national limitations it is not the whole answer to complete subject coverage in any single field, but it could point the way—even by its mistakes—eventually to whole answers on a global scale. The reasons why there are few signs of a world technical literature index are not wholly organizational or linguistic in character, though these factors are in themselves daunting enough. There are, in addition, many fundamental questions of index use and structure still to be resolved. Many of these questions can be investigated only by carrying out indexing projects. The amount of support for the *Index* in non-English speaking countries has pleasantly surprised us, and it is perhaps significant that a French reviewer of BTI thought the British project might usefully be paralleled elsewhere. I hope therefore that the BTI will be supported by British special librarians not only on account of the various ways in which it may be immediately helpful, but also because it is a step in the right direction—towards wider bibliographical control, which we all desire to see extended to technical literature originating in all parts of the world.

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6. MARKUS, J. State of the art of published indexes. *American Documentation,* vol. 13, no. 1, January 1962, p. 15–30.
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8. BROWN, *Sir* L. The future of the scientific paper. *Journal of Documentation,* vol. 18, no. 1, March 1962, p. 1–5.

DISCUSSION

The first speaker, Mrs K. Bourton (Constructors John Brown Ltd), asked if the BTI had been criticized for lack of annotations. Mr Coates replied that this point had been mooted in some reviews, but that cost and time factors ruled out annotations. In answer to a question by Mr B. C. Vickery (National Lending Library for Science and Technology) he said that he had no cost data available comparing a subject heading index of this kind with a mechanized index. Dr D. J. Campbell (Pressed Steel Company Ltd) thought that some letters should be indexed; Mr Coates agreed, and said that some of the categories excluded from BTI might be considered for inclusion later on. Miss Barbara Kyle (Aslib) pointed out that comprehensive national coverage was the first pre-requisite for complete international coverage, and she therefore welcomed the initial terms of reference of BTI.

In reply to questions by Mr G. H. Wright (Hatfield College of Technology) and Mr C. W. Cleverdon (College of Aeronautics), Mr Coates said that BTI would be cumulated annually; and that each person indexed between sixty and seventy articles per day. There were four indexers. Mr S. R. Loynes (Wiggins Teape Research and Development Ltd) asked what would happen to BTI if subscriptions fell off; Mr Coates replied that the Library Association would accept losses for three years. Answering Mr R. C. Wright (Royal Aircraft Establishment) he said that the following possible extensions to the service were being borne in mind: more frequent cumulations; wider coverage of journals; more direct entries.

Mr D. V. Arnold (ICI Heavy Organic Chemicals Division) concluded the discussion by pointing out that the BTI's sister publication, *British Humanities Index,* made a small profit, and this augured well for the future of BTI.

LINKING RESEARCH AND DESIGN

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36th Annual Conference, Blackpool, October 1962

INTRODUCTION

THIS paper describes a fully integrated technical service, as represented by the author's Department, and treats briefly some of the methods for finding and using technical information which are employed. As the integrated technical service is a component of the research-design-production complex and relies primarily upon the services of engineers and scientists, its concepts of data recovery—and its methods in general—are heavily influenced by the technologist's inherent knowledge of his subject and the relevant sources of information. It is concluded that much may be gained from the integration of technologists into the whole process of information dissemination and that integrated technical services may be of assistance in many fields beyond those in which they have already proved effective.

GENERAL

Before discussing any activity related to a fashionable and controversial topic, such as 'the information problem' or 'the literature explosion', it is well to examine the motivation of that activity lest all idea of perspective be lost. Many thousands of words have been written deploring the current status of information retrieval and utilization and many dramatic catch phrases have been coined describing the scale of the phenomenon and its economic consequences. These words and phrases must not be ignored, nor must the possibility that they may generate the most sinister motivation known to man—panic. Under such motivation it is not unknown for massive efforts to be exerted, using the most obvious remedies to achieve but disappointing results, if not worse. There may be no antidote to the 'literature plague' but an astringent may be found if a careful assessment is made of all the symptoms. This requires examination of the attitudes and procedures not only in information traffic but also in the sources generating the traffic and among those who should benefit by it.

The present-day industrial product relies heavily upon the timely transfer from research organizations and other sources to the factory of large quantities of research and development information, often contained in reports and other forms of literature. Few, if any, industrial concerns are self-supporting in research information and it is necessary to transfer information from a large number of sources to a large number of users. Even when such transfer is accomplished there remains the major problem of a variability of competence, outlook and language between the groups providing the basic information and those wishing to use it. There is the added complication that the latter, under commercial and economic pressure, have only a limited amount of time which can be allocated to the assessment of research information. These problems are general, no matter what the economic background of the community in which an industrial producer is situated, and there are additional considerations in the case of communities which have strictly limited research potential whose products must compete in a world-wide market. A case in point is the United Kingdom. This country is not ill-endowed with research facilities; the expenditure on research as a proportion of the gross national product is by no means insignificant in comparison with that of other countries. Unfortunately, although the ratio between expenditure and gross national product may be a useful criterion when talking of expenditure on education, social services or almost anything else it is almost meaningless as a criterion of research needs as distinct from research capacity. Products which rely extensively on technical information can only compete if the data utilized are comparable in extent and quality with those utilized by the competitor. The *proportion* of his resources which each competitor expends on research is almost totally irrelevant. Accordingly, a country like the United Kingdom having a wide range of industrial products is, in general, heavily dependent on research information originating abroad. Its products will be competitive if it is competent in finding and using the large quantities of research information which, fortunately, are freely available from abroad in addition to those data which are generated by its own research efforts.

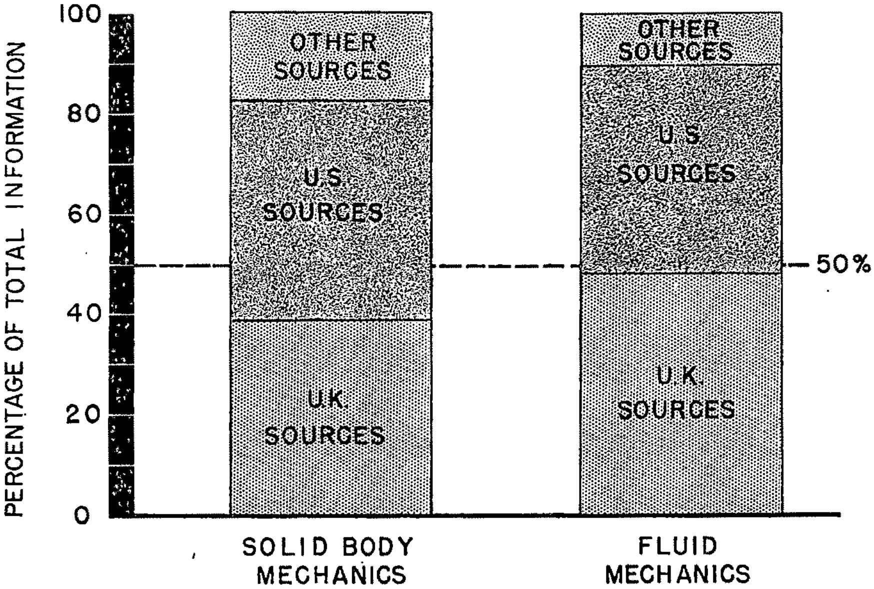

FIGURE 1. *Geographical distribution of sources of information*

The extent to which information of foreign origin is used in the Society's Technical Department is illustrated in Figure 1. For two broad fields, Solid Body Mechanics and Fluid Mechanics, it is seen that over 50 per cent of the information used in the Department's work of synthesizing authoritative design and analytical procedures originates abroad. Nearly identical results from two fields requiring very different types of research facility and having very different historical background suggests that similar results might be expected in other technologies if a similar type of activity were in progress.

THE INTEGRATED TECHNICAL SERVICE

The integrated technical service is motivated by the desire to achieve advanced competitive industrial products and services through the most effective use of research information obtained from all sources. This leads to the need to produce by collection and correlation, design and analytical tools which do not involve the user in extensive searching for, or reading of, the original literature. Further, in view of the disparity between the outlooks and even language of the researcher and designer, it is necessary to provide the latter, in effect, with a critical faculty which he might not otherwise possess. To such a service there are many side issues and by-products. For example, it is possible to utilize a number of data which are unpublished either because of the lack of time of research workers to write up their findings in detail or because they contain proprietary or confidential features; these features can often be hidden in the final product of the service. Such a service automatically highlights gaps in current research which, when filled, enable a whole range of older data to be utilized more effectively. The process of correlation itself will suggest, from time to time, new relationships between basic phenomena* which can be fed back to research organizations for fruitful further investigation. These side issues and by-products are too extensive to dwell upon further in this present account.

Figure 2 is a flow diagram representing the broad organization of the Society's technical work. The technical staff is composed of fully qualified engineers and mathematicians, many of them with both research and design experience. The work-cycle starts with a feed-in from industry, and to some extent the research organizations and universities, of views on problems of present and future importance. These views are obtained by questionnaires, visits to companies, appeals from companies, etc. After discussion by the technical committees (which are composed of leading workers in each particular field and drawn from research, industry and universities), priorities to the work of the Department are established. There follows a process of collecting relevant information from research establishments, directly, or more often through their publications. This is carefully examined by the staff, theories are checked or extended and compared with experimental data, experimental data from a wide range of sources are analysed and there is drafted a design or analytical procedure with the requisite numerical information for its use. This is examined by the appropriate technical committee for veracity, for intelligibility to design personnel, for the superposition of practical experience, etc., and after an average of two

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* Two recent examples of this, of interest to the specialist reader, are contained in references 4 and 5.

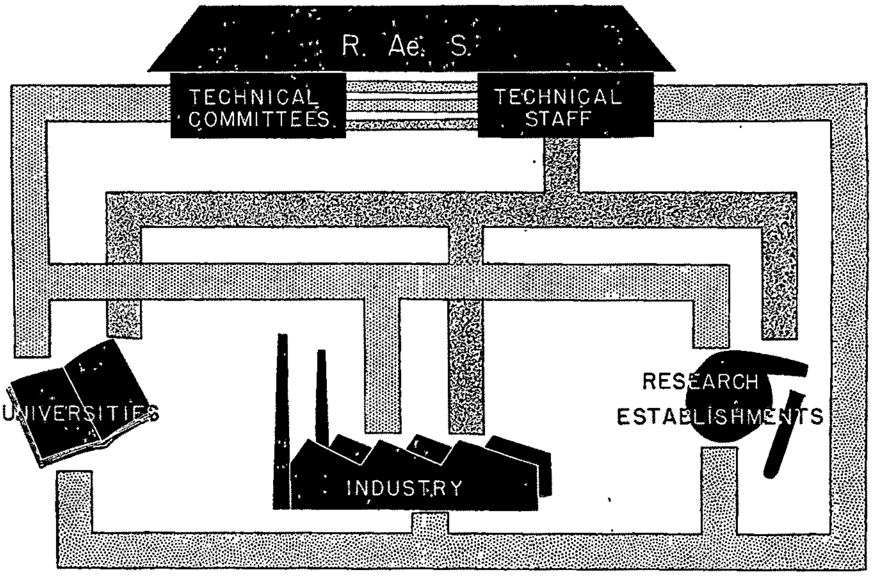


FIGURE 2. *Organization of the Society's technical work*

re-draftings is approved for issue. This is usually made in the form of data sheets, a simple example of which is shown in Figure 3. After issue the sheet is used in industry and, over the years, experience in its use is fed back to the Technical Department from numerous design teams. Designers comment not only upon their experience in tests on, and the performance of, products designed with the aid of the sheets but also on the convenience of form of presentation of the data. The data sheets are reviewed periodically to ensure that they contain the latest information and, as necessary, are re-issued. Features of this system which should be particularly noted are that the major part of the work is accomplished by a full-time staff of qualified engineers, that the pertinence and authority of their work are ensured by its being able to reach the industry only through expert committees of wide experience, and that the system is closed by the feed-back of information from the users. The reasons for the description of this as a fully integrated technical service should now be clear; it forms an effective link and catalyst in the research-design-production process.

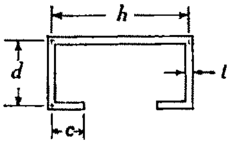
Almost every aspect of the workings of an integrated technical service has special and unusual features but it is beyond the scope of this paper to describe them in detail. Attention will be confined to one or two concepts which are likely to be of particular interest to the present reader.

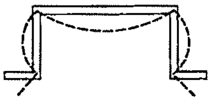
FINDING BASIC DATA

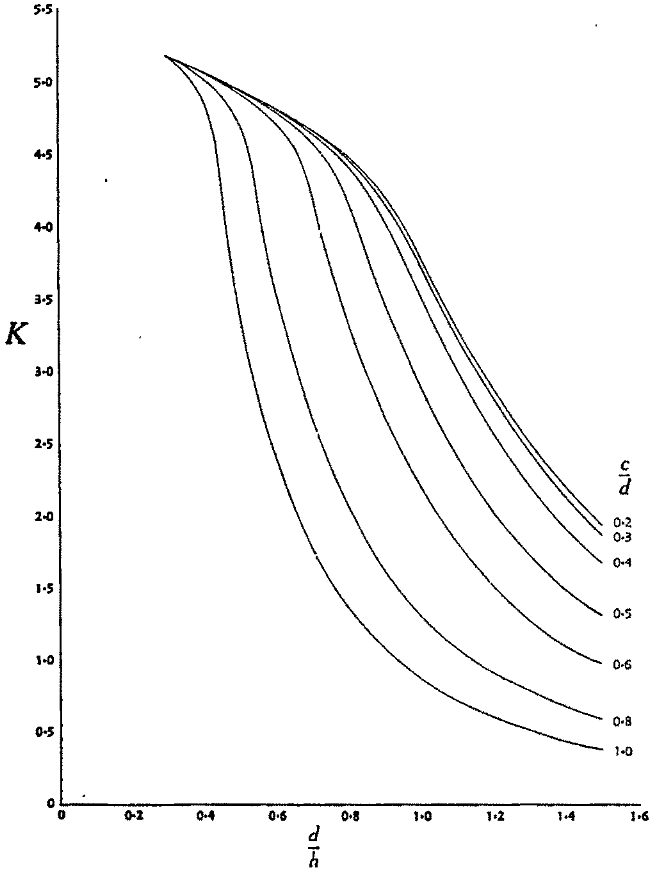
One of the principal requirements of the system is to be able to locate, efficiently, a large proportion of the available information on a given problem. This 'information problem' may usefully be thought of as a three-dimensional

01.01.18

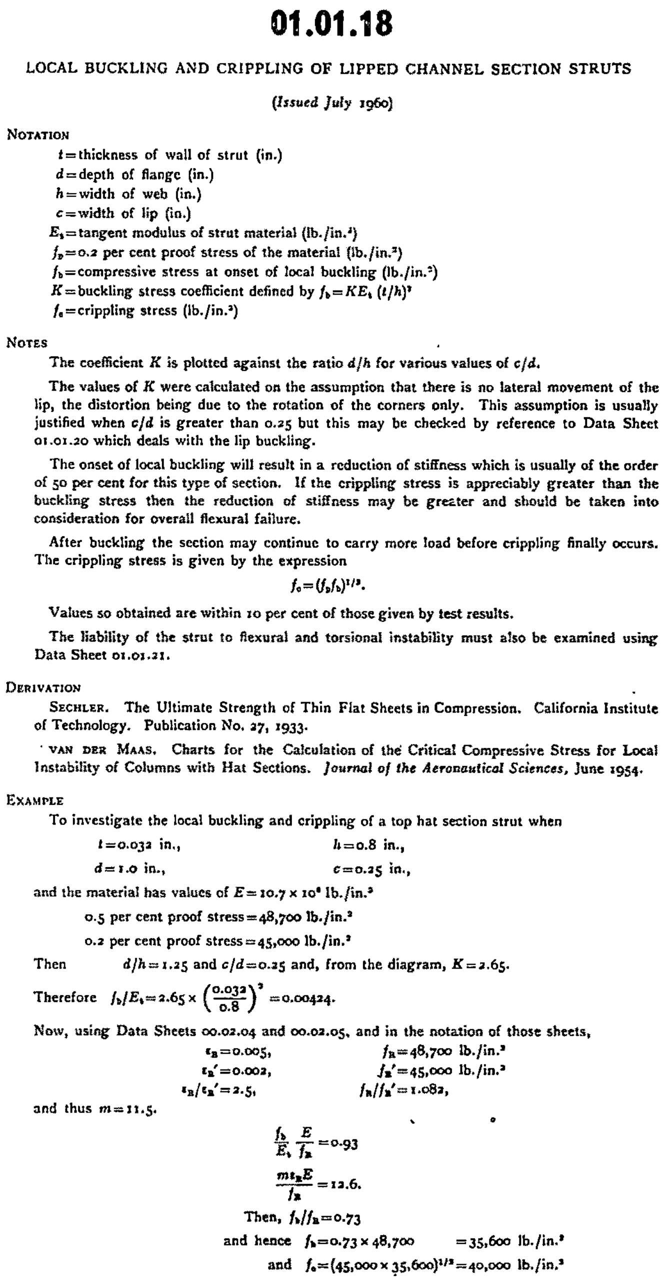
LOCAL BUCKLING AND CRIPPLING OF LIPPED CHANNEL SECTION STRUTS







(In the actual data sheet the curves are printed over a fine grey grid)



01.01.18

LOCAL BUCKLING AND CRIPPLING OF LIPPED CHANNEL SECTION STRUTS

(Issued July 1960)

NOTATION

t = thickness of wall of strut (in.)
d = depth of flange (in.)
h = width of web (in.)
c = width of lip (in.)
E_t = tangent modulus of strut material (lb./in.^{2})
f_p = 0.2 per cent proof stress of the material (lb./in.^{2})
f_b = compressive stress at onset of local buckling (lb./in.^{2})
K = buckling stress coefficient defined by $f_b = KE_t\,(t/h)^2$
f_c = crippling stress (lb./in.^{2})

NOTES

The coefficient K is plotted against the ratio d/h for various values of c/d.

The values of K were calculated on the assumption that there is no lateral movement of the lip, the distortion being due to the rotation of the corners only. This assumption is usually justified when c/d is greater than 0.25 but this may be checked by reference to Data Sheet 01.01.20 which deals with the lip buckling.

The onset of local buckling will result in a reduction of stiffness which is usually of the order of 50 per cent for this type of section. If the crippling stress is appreciably greater than the buckling stress then the reduction of stiffness may be greater and should be taken into consideration for overall flexural failure.

After buckling the section may continue to carry more load before crippling finally occurs. The crippling stress is given by the expression

$$f_c = (f_p f_b)^{1/2}.$$

Values so obtained are within 10 per cent of those given by test results.

The liability of the strut to flexural and torsional instability must also be examined using Data Sheet 01.01.21.

DERIVATION

SECHLER. The Ultimate Strength of Thin Flat Sheets in Compression. California Institute of Technology. Publication No. 27, 1933.

VAN DER MAAS. Charts for the Calculation of the Critical Compressive Stress for Local Instability of Columns with Hat Sections. *Journal of the Aeronautical Sciences,* June 1954.

EXAMPLE

To investigate the local buckling and crippling of a top hat section strut when

$t = 0.032$ in., $h = 0.8$ in.,
$d = 1.0$ in., $c = 0.25$ in.,

and the material has values of $E = 10.7 \times 10^6$ lb./in.^{2}

0.5 per cent proof stress = 48,700 lb./in.^{2}
0.2 per cent proof stress = 45,000 lb./in.^{2}

Then $d/h = 1.25$ and $c/d = 0.25$ and, from the diagram, $K = 2.65$.

Therefore $f_b/E_t = 2.65 \times \left(\frac{0.032}{0.8}\right)^2 = 0.00424.$

Now, using Data Sheets 00.02.04 and 00.02.05, and in the notation of those sheets,

$\epsilon_B = 0.005,$ $f_B = 48{,}700$ lb./in.^{2}
$\epsilon_B' = 0.002,$ $f_B' = 45{,}000$ lb./in.^{2}
$\epsilon_B/\epsilon_B' = 2.5,$ $f_B/f_B' = 1.082,$

and thus $m = 11.5$.

$$\frac{f_b}{E_t}\,\frac{E}{f_B} = 0.93$$

$$\frac{m\epsilon_B E}{f_B} = 12.6.$$

Then, $f_b/f_B = 0.73$

and hence $f_b = 0.73 \times 48{,}700 = 35{,}600$ lb./in.^{2}

and $f_c = (45{,}000 \times 35{,}600)^{1/2} = 40{,}000$ lb./in.^{2}

FIGURE 3. *A typical* R.*Ae.S. Data Sheet*

picture. The reader is asked to imagine that each of the spots in Figure 4 represents an item of literature (a report, journal paper, company memorandum, etc.). Each may be put in its own place in the framework by locating it at the correct point in time (here shown in years), at the correct subject along the subject spectrum axis and in the correct source position (each division up the axis labelled SOURCE represents a particular laboratory, university or other source of origin of the item of literature). Obviously, if one knew the source of origin, the date of issue and the precise subject of a report, one could locate it.

The collection of items in Figure 4 is not homogeneous, there are gaps in some areas, crowds in others. The object is to find, with as little effort as possible, all or most of the literature available for a given part of the subject spectrum and to find it in a sequence which is compatible with its efficient incorporation in a resultant design tool. One might search blindly, using a machine in which this information had been recorded, searching continuously back and forth until all the relevant items had been found. Or one might employ search rules such as those suggested by Lykoudis, Touloukian,[1] and others and these also generally presuppose no knowledge of the likely topography of the volume of items. Now the technologist conducting a search need not assume complete ignorance of the likely topography; from his general knowledge of a subject he will know, if only qualitatively, of the time history of his subject, of the relationships between subjects and the sources producing information on these subjects and so on. If he is properly instructed he can infer sufficient of the likely features of the topography of the literature to be of considerable assistance in his search, whether he conducts it himself or has the assistance of others to do so. Furthermore, the technologist does not always want, and may often be embarrassed by having, all the information feed simultaneously. It is usually more convenient to have a part of the most useful

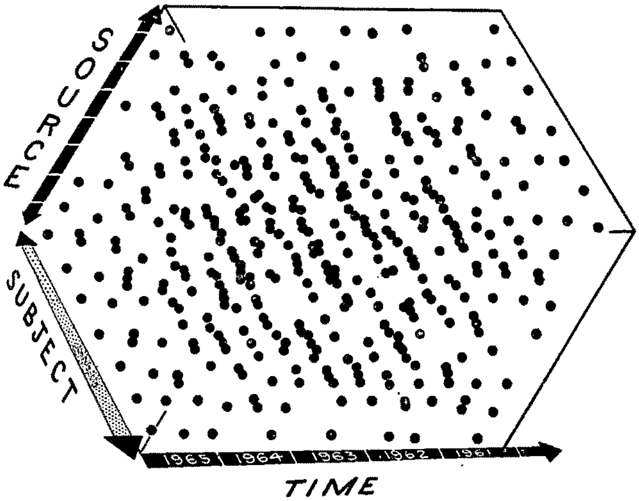


FIGURE 4. *Three-dimensional representation of an information problem*

information as quickly as possible and the remainder provided over a period as his work continues and he refines the design procedure on which he is working. His search procedure should ideally be tailored to suit his overall work load.

As is well known, many literature requirements cannot have a simple subject allocated to them. A particular feature may initially seem of greatest importance yet other fringe features may eventually yield more useful information. This is the problem of classification, be it a formal library classification, keywords or whatever, and also gives rise to the current interest in thesaurus work. Accordingly the subject variable is seen as a spectrum, on either side of the subject of prime interest are other subjects of gradually decreasing interest. Figure 5 illustrates a typical spectrum encountered in searching for data on elastic stress-concentration effects. These might be sought under a heading such as Elastic-Analysis yet it has been found that papers on related matters, often not obviously related, have yielded useful data and background information. Accordingly, before searching for information it is necessary to ponder the likely spectrum of subjects and the width of the spectrum to be searched. The technologist's training and experience enable him to consider this point and he should be called upon to do so.

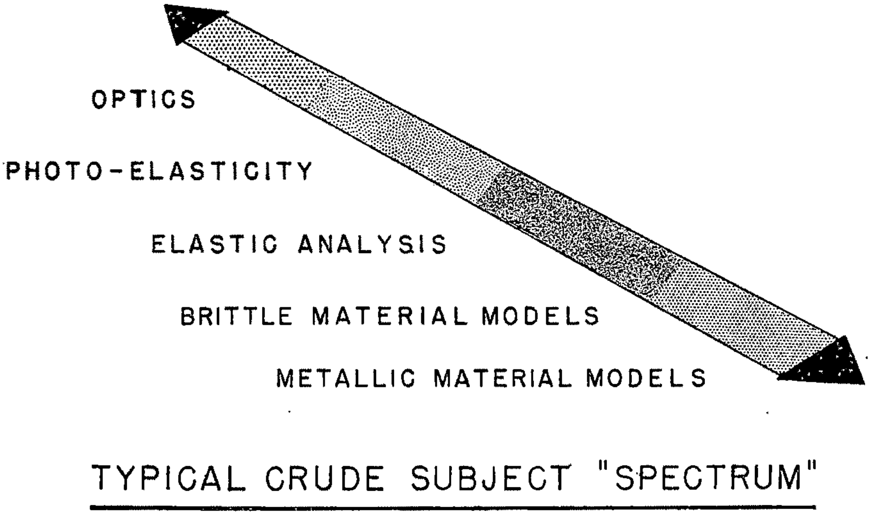


FIGURE 5. *Typical crude subject 'Spectrum'*

Time variations are a most important feature. Here again, the practising technologist possesses most pertinent qualitative information, if he is trained to recall it, which will be useful in starting the search at a propitious point or in guiding its progress. Though literature in general may be exploding it is not doing so in all fields. Some is at a steady level of output, other subjects produce less literature as time passes. Variations in output are the result of scientific discoveries touching off new technological branches, or result from political and commercial decisions many of which will be in the experience of the the technologist. Two time histories showing the percentage of the total information available up to 1960 on two aeronautical subjects are presented in Figure 6. They are very different in nature and the explanations of the principal features of the variations in output of information in each subject are obvious enough. The decrease in interest in man-powered flight during the war years is probably a consequence of the limited military significance of the subject. The development of high power-weight ratio engines since the war, and certain political and operational desiderata, have led to an explosion-type growth in the literature on Vertical and Short Take-off Aircraft. Even a qualitative impression of such variations provides a searcher with useful information on the general topography of the literature of the subject and useful guides on how to conduct his search.

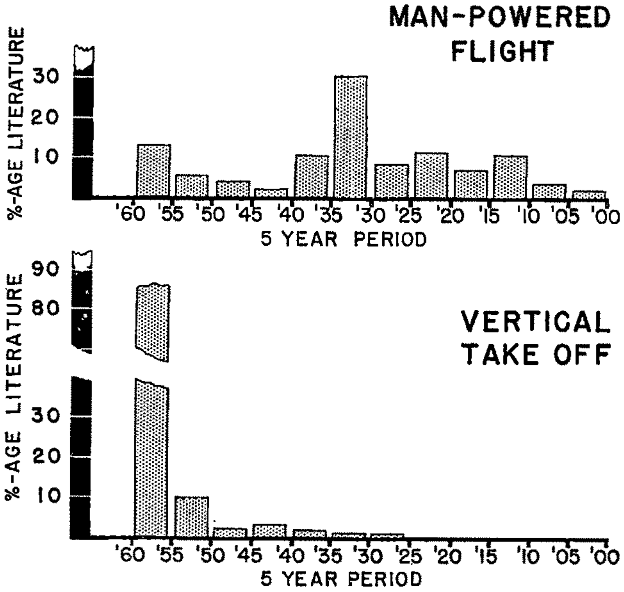


FIGURE 6.
Build-up of information with time for two subjects

The relationship between literature and the source of issue is at first sight the most intractable yet leads to the most interesting results. At least the time scale of Figure 4 is continuous and a subject spectrum scale is conceivable, but how a source, say a laboratory or other report-issuing organization, can be related to any other is not at all obvious. Some time ago the Department examined a number of its own bibliographies to find the proportion of the literature originating from each source. Essentially this was an investigation of reference scattering although it was done in the ignorance of the work of earlier investigators such as Bradford.[2] Plots were made of the number of sources issuing various proportions of the total literature in a manner very similar to that most excellently reported by Cole[3] but the variabilities in the results were considerable and did not seem related to any particular features of the subjects concerned. Showing no sign of how this was likely to assist in literature searching, the matter rested for some time. However, the exercise had indicated a useful means of classifying sources, namely, by the frequency with which they issue literature on a given topic or, over a given period, the proportion of the total literature on the topic which each source issues. This was to prove of some importance when it was coupled with the thought that part of the stock-in-trade of a technologist was a knowledge of the sources which, on any given subject, were likely to have produced the most information; if he did not know the largest single source he would probably be able to specify the three largest. Accordingly, the data which had been extracted from the Department's own bibliographies were replotted in the form shown in Figure 7 as the sum of the references originating from the three largest sources against the total literature items on the subject. Results from other bibliographies prepared elsewhere were incorporated and suggest a relationship between the production of literature from the three largest sources and the total literature.

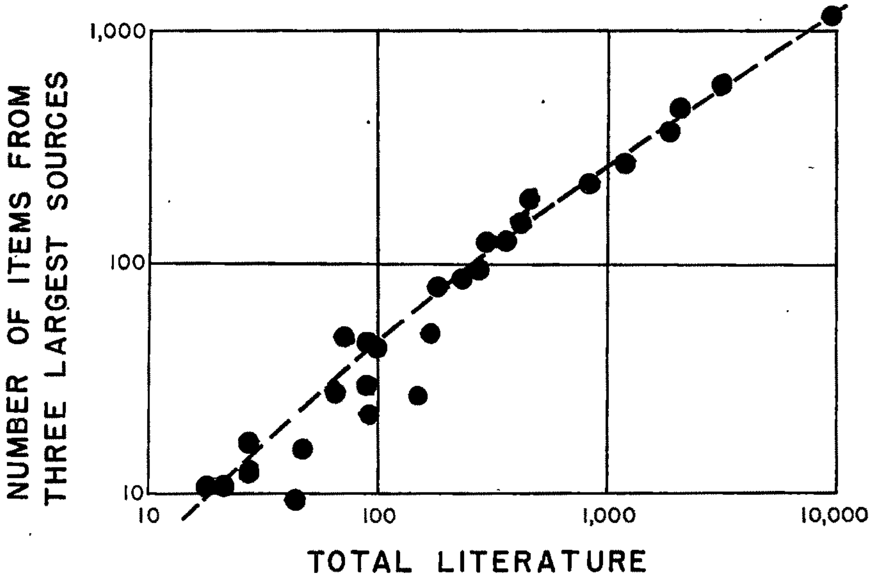


FIGURE 7. *Tentative correlation between output of largest sources and total literature*

Fortunately the larger sources of information are also the ones most likely to provide indexes of their papers or to be included in abstracts. Accordingly, it is a straightforward matter to count the number of relevant items produced over some period of interest by the three largest sources, and from the sum of these items to obtain from Figure 7 an estimate of the likely total volume of literature to be obtained. Thus at an early stage, the technologist is in a strong position to know how to get on with his problem and how to continue his search, for the following reasons:

1. An estimate is available, even if it is crude, of the total number of items which will have to be consulted.
2. As much as 50 per cent (if the total literature is small) of the information

has been found from the survey of the indexes or abstracts relating to the three largest sources.

3. An evaluation of the literature from the three largest sources will indicate whether it is desirable to widen or narrow the subject spectrum in the following stages of the search and provide some idea of the time history of the subject.
4. Since the larger sources themselves are usually well endowed with information services, the bibliographies in the reports which they produce will probably be well informed and provide a further useful amount of the remaining items.
5. There is some evidence to suggest that the literature found from the larger sources will contain a high proportion of the really useful and up-to-date information.

In summarizing this part of the description of suitable methods for use by integrated technical services it must be noted that the staff is concerned not only with finding the total information which may have been classified in some system under a particular heading (in which they may be assisted by being able to draw upon the assistance of conventional library services), but also in obtaining it in a systematic manner, and in continuously evaluating its relevance to the current problem as the work builds up. Accordingly, the technologist should not approach his search armed only with an oblique request for information but should be able to provide for those whose assistance he seeks, or for his own guidance, as much as possible of the following search specification:

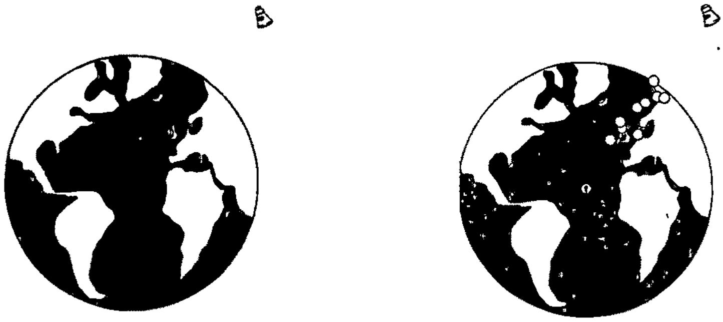
1. A considered statement of the subject of the inquiry and its breadth (subject spectrum).
2. The probable largest sources of the information.
3. The history of the subject; in particular the probable influences, technical, political and commercial, which are relevant.
4. An estimate, however crude, of the probable total volume of literature to be retrieved.

As the literature is retrieved the technologist should be prepared to note errors in the initial assessment and to modify it for the future guidance of the search.

USING BASIC DATA

The preparation of the end-product of the work, usually some form of design or analytical method in documentary form of which the Royal Aeronautical Society's Data Sheets are the most prominent example, may commence its initial stages at the time of the commencement of the search. Before it is completed it will have to be examined for authenticity and incorporate the very best information which is available for its construction. These are matters requiring most carefully thought-out procedures but which are probably of only slight interest to the present audience. Another requirement of the design or analytical tool which is of prime importance is the convenience to the user, and suitability to the problem in hand, of the final presentation.

Modern technical report writing is subject to a great deal of criticism; style, logical argument and clarity often suffer as a consequence of various inducements to report quickly and extensively upon the findings of research. However, it is not the failings of research reporting alone which invalidate the technical report as an ideal medium for the final stage of conveying information to the designer or technical analyst. The whole concept, construction and format of the document intended for direct use is different from that of the classical research report. The document for direct use must be of limited and clearly defined scope: its authenticity must be acceptable to the user without his having to check its derivation himself: it should be capable of application with the minimum of reference to other literature: it must state its limitations clearly and provide directions as to where further information may be found: the presentation of the information—both the explanation of the method to be followed and in the numerical data—must be precise and unambiguous.



FIGURES 8, 9. *A simple experiment on the presentation of information (I)*

The presentation of the simplest technical information requires careful thought if it is to be readily intelligible and unambiguous. Most writers of technical literature would readily agree with this, yet few demonstrate an appreciation of the extent to which care really must be taken. This is illustrated by a simple experiment which the author conducted recently. Figure 8 is a view of Earth as seen by an observer from a point in space. A satellite of the type used in the NASA Mercury Project can also be seen. Each of twelve engineers was given such a picture and a verbal explanation of what was depicted. Each one was asked to mark the spot on the Earth's surface directly below the satellite* and to do so in a limited time without working out a proof of his answer. In other words, each one was asked to indicate the point which 'appeared' to be the one directly below the satellite. Figure 9 is the collection of the points which were marked in answer (in addition two replied that they 'didn't know'). Only one gave the correct answer, the centre of the Earth's disc. The subjects were then given a similar picture showing two satellites and asked to

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* More precisely, the point directly in line with the satellite and the Earth's centre.

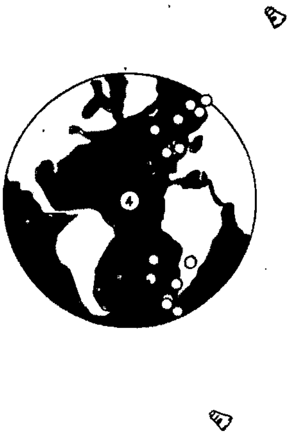

FIGURE 10.

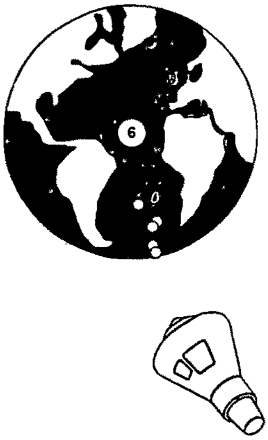

FIGURE 11.

A simple experiment on the presentation of information (II)

mark the points directly below each; Figure 10 records the results. It is seen that four of the twelve now gave the correct answer. Possibly they realized subconsciously that only a few hundred feet, at most, could separate the two satellites and that to mark two points on earth several thousand miles apart would be inconsistent, this consideration leading to the selection of the correct answer. Finally the participants were given a picture showing the same satellite a few hundred yards nearer to the observer and again asked to mark the point on earth directly below the satellite; six now gave the correct answer, as shown in Figure 11. Possibly it was realized that if the satellite had been moved a few feet from the position shown it would have appeared over the centre of the Earth's disc, thus leading to the conclusion that marking a point other than a few feet on the earth disc away from its centre would be inconsistent. After the test, given a little time, most of the participants realized what the correct answer should have been in each case and some exhibited annoyance at their own inability to provide it. All were engineers completely familiar with the simple arguments by which they could have produced the answer and all were considerably experienced in the use of technical literature. Whether the experiment really demonstrated that one or other of the presentations of the information on which each participant was asked to make a decision was better than the others may be open to question on the basis of such a limited test. What is not open to question is that a simple presentation of information relating to a familiar and simple basic problem made many different immediate impressions on experienced people. The significance of this must not be overlooked by anyone responsible for the presentation of information by means of diagrams, curves, charts, etc., to those who need to use the information, particularly if the latter's knowledge and experience of the information are limited.

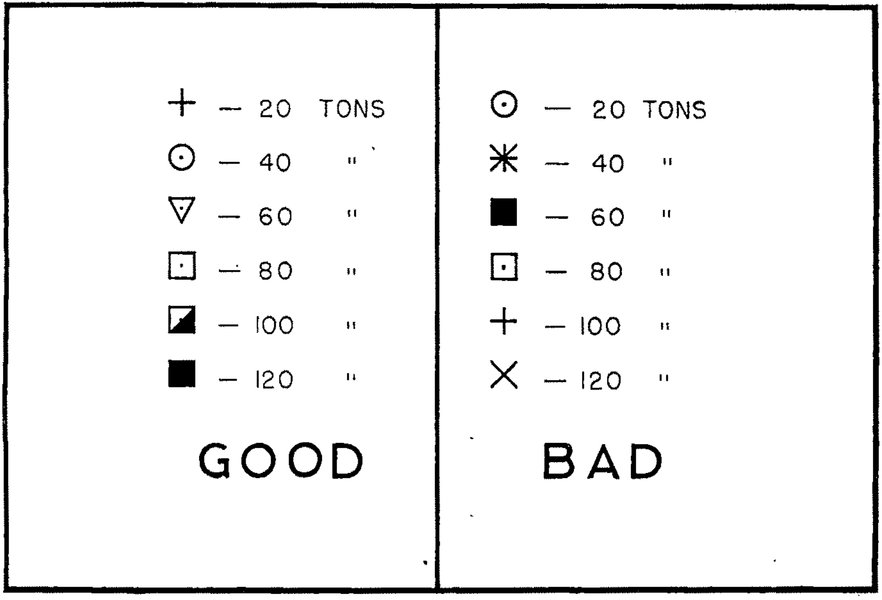

FIGURE 12. *The use of symbols*

The careful choice of the means of presentation of information goes far beyond the need to provide a quickly intelligible and unambiguous picture, as a further example will illustrate. Figure 12 shows two keys for graphical symbols such as may often be used in the presentation of a mass of experimental data. The key on the right-hand side is obviously bad, since if the two points representing results for 100 and 120 tons become superimposed they may be misread as one result for 40 tons, thus leading to ambiguity. However, there is an important objection beyond this. The eye is most impressed by the heavier and angular symbols and the scale of impression on the eye caused by the bad system reads: 100, 120, 20, 40, 80, 60 tons to most observers; this is unrelated to the scale of the physical phenomenon which is being represented. In the good system, the scale of impression on the eye is consistent with the scale of the phenomenon, the eye being drawn through the sequence 20, 40, 60, 80, 100, 120 tons in proper order.

Not only is it important in the final presentation of information to a user that every device be used to make that presentation consistent with natural reflexes, it is of considerable importance during the process of data correlation. The example shown in Figure 12 is based on a recent experience of the author in which an important correlation was obscured until the data were replotted on the basis of a more consistent set of graphical symbols. These simple examples suggest that the use of information, particularly in the preparation of design and analytical tools, is a matter requiring particular care and experience; it is one of the functions of the integrated technical service to supply this.

CONCLUSION

This paper demonstrates the author's belief that many aspects of the technical literature traffic must be regarded as an integral part of the technology to which that literature relates. The engineer or designer cannot be regarded as a somewhat passive recipient of research literature; he has an important part to play in the linking of research and design alongside the more conventional services. The technologist has knowledge and experience which, if he is trained to recall and employ it, will materially assist the literature retrieval process whether it is carried out by library and information services or by the technologist himself. In the stages of assessing and using the information thus found, the technologist likewise has knowledge and experience which must be properly directed in the synthesis of analytical and design tools, particularly if these are to be used by others. In the interests of the economic well-being of the community it is highly desirable that the tools should be prepared once but used by a wide group of producers. The economic integration of the technologist into the process of linking research and design may best be achieved by the establishment of integrated technical services of the type which the author has the privilege to serve and to describe in this paper.

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DISCUSSION

In reply to questions, Dr Barrett said the output of data sheets was about 150 new sheets a year. In addition, the work was continuously under review, new data being incorporated as promptly as possible into existing sheets. The sheets, covering the three basic fields of aerodynamics, structures, and materials, occupied a staff of ten. Dr Barrett agreed that when he spoke of the three most prolific sources of information he meant the most prolific for each subject covered, not that the three sources were the same for the entire field of aeronautics.

Mr A. R. Andrews (English Electric Aviation Ltd) commented that the figure of nearly 50 per cent of the whole shown as being the United Kingdom contribution (Figure 1) seemed high, and asked how 'item' was defined. Dr Barrett replied that an 'item' was a report, company memorandum, or similarly identifiable document.

Dr E. J. Holmstrom, with obvious distaste for loose-leaf binders, asked whether recipients appeared to like the data sheets punched for this form of binding. Dr Barrett agreed that punched sheets had some disadvantages but knew of no completely satisfactory alternative method of keeping together sheets which might need fairly frequent re-sorting and re-collating. Besides, the method had been adopted twenty years ago and could not easily be changed unless there were a greatly superior alternative.

THE RELATIONS BETWEEN A CENTRAL INFORMATION UNIT AND SECTIONAL UNITS. PART I.

THEORETICAL CONSIDERATIONS

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36th Annual Conference, Blackpool, October 1962

INTRODUCTION

THE decision by Aslib to allocate a complete session of the Annual Conference to two papers on the relations between a central information unit and sectional units is an attempt to bring into the open a question which has for years been clouded in prejudice. The growth of information services, whether on an international, national, industry, or laboratory scale, has often been haphazard. A central unit, or a number of sectional units, or both systems together, may have developed as a result of pressures which often do not reflect the true needs of the users. The purpose of this paper is to try to review the problem objectively and to see what principles should govern the relationship between various units concerned with information within an organization (using the word organization in its widest sense).

Two papers are being presented during this session, both dealing with the same subject. We have tried hard to avoid saying the same thing twice, and in order to achieve this I will attempt to restrict what I have to say to the more theoretical aspects of the question, leaving my colleague to present practical examples of the types of relationship which exist between information units within certain specific organizations.

Many of you may feel that this problem is one peculiar to large companies; that the papers will be of no interest to those who operate small information units. But we must remember that any user who maintains his own specialist information file can be considered as a 'sectional' unit in relation to a 'central' unit which supplies information to him and to other users. It must also be realized that a comparatively large specialized library, which may be a 'central unit' in its own sphere, is a 'sectional unit' to the National Central Library if it is on the NCL's books as an 'outlier'.

These examples may serve to demonstrate the breadth of the subject we are setting out to discuss, and to dispel the idea that one's own information unit can be considered as a unit in unrelated isolation. They also serve to underline the difficulty of formulating principles which can apply to extreme cases at either end of the scale.

WHY CENTRALIZED UNITS?

Many arguments have been put forward in favour of centralized information facilities. In a paper entitled *Planning an Information Service*,[1] which was read at the Summer meeting of the Institute of Petroleum last year, E. H. E. Jones listed the following major advantages: better use of space and staff; the possibility of using higher calibre employees through improved scope and wider responsibilities; wider contacts; and a more even development in the various branches of information. These are all powerful reasons, based both on economic considerations and on the need to supply the most efficient service for the user.

It has also been said[2] that the most important advantage of centralization is the ability to give company-wide service, whether or not company units are geographically scattered.

I do not wish to say more about the advantages of centralized information units at this stage, because this will be developed more fully in later sections of this paper, and by my colleague in the following paper.

WHY SECTIONAL UNITS?

In essence, a sectional information or library unit is one that only covers the needs of a section of the organization viewed as a whole. An individual who supplies his own information needs while working as part of an organization must thus be considered as a sectional unit.

Inevitably, unless positive steps are taken to influence it, growth of information facilities within an organization will start as a series of sectional units. Initially it may be a few individuals whose information problems are acute and who start their own subject indexes and collection of books, journal articles and papers. At some point one or more of these individual units may coalesce to form a larger unit to cover the needs of a number of individuals; or a central information unit may grow up in (or be imposed on) the organization to take over all or part of the activities of the sectional units.

Apart from haphazard growth, however, what are the theoretical reasons for initiating or retaining sectional information units in an organization?

The first and most usual reason is the geographical separation of parts of the organization. Such separation will affect the speed of supply of material to the user. More important, it will prevent personal contact between the user and the supplier of information, and may therefore have an adverse effect on the ability of the supplier to interpret the true needs of the user.

Speed of supply of material to a user is in most cases an essential pre-requisite of an information service. Whether a remote laboratory, factory, or office can be served adequately by an existing unit elsewhere, or whether it should have its own unit, must depend to a large extent on the importance attached to immediate availability of material. The cost of making loan material or photocopies available from elsewhere is high and a small local unit holding original material may be cheaper to run.

The advantages of personal contact are more difficult to assess. The importance must of course depend on the type of information service under consideration. In the full sense of the words, an 'information service' implies an active role which will include acquisition, selection, dissemination, storage and retrieval of information in specific subject fields. Success must depend to a large extent on a very exact knowledge, on the part of the subject specialists in the information unit, of the day-to-day interests and problems of the specialists requiring the information. This is obviously best fostered by personal contact between information officer and user, and is bound to be adversely affected where such contact is lacking.

The second main reason for maintaining or initiating sectional units is the need for subject specialization. This may take the form of a need for special treatment of information in a narrow specialist field within the broader field covered by a central unit; information may need to be evaluated or augmented in relation to 'on-the-job' work. In either case the actual 'need' for sectional units is hard to assess; the information expert may rightly claim that any degree of subject specialization can, in theory, be catered for within a central unit, provided that appropriate subject specialists and techniques of information retrieval are employed.

Flexibility has also been quoted as an advantage of smaller units. In an article entitled 'Progress in "Probitation" ',[3] M. V. Otis says: 'There has been the tendency for systems planners to feel that large centralized computer operations are the ultimate answers to the most effective information system in any given environment. The experience of the pioneers in this field, however, has revealed that decentralized operations have many advantages. It is more convenient to convert small decentralized systems to the rapidly changing technology than large-scale operations.'

ORGANIZATIONAL RELATIONSHIPS

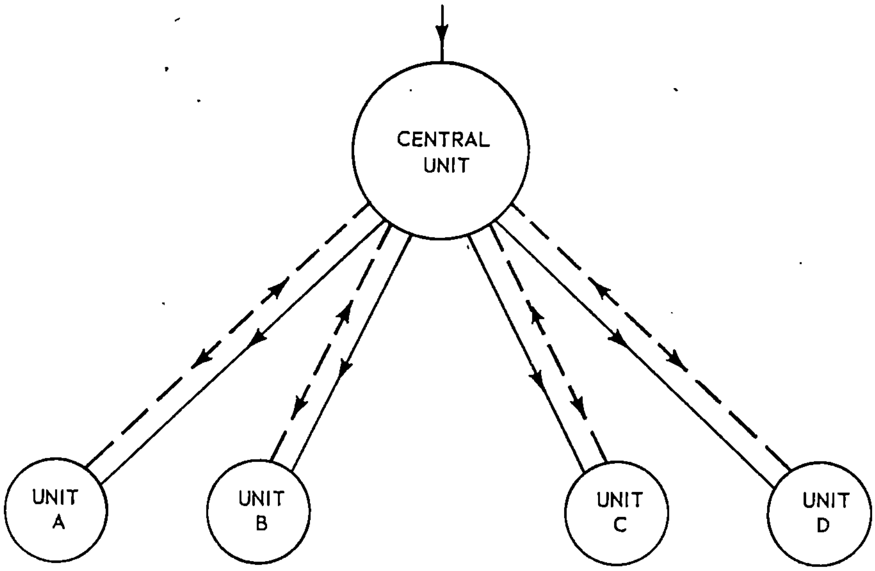
Having looked briefly at some of the reasons for sectional and central units let us look at some of the possible organizational relationships which may link them.

At a Symposium on the Administration of Technical Information Groups[2] presented a few years ago at a meeting of the American Chemical Society, an attempt was made to study the organizations in two different categories: 'Information groups in "centralized management" organizations', and 'Information groups in "decentralized companies" '. This approach does not necessarily lead us to the relationships we are looking for in the information field. Although to a certain extent the organization of information units may follow the administrative 'fashions' of the parent body, such an approach does not take into account the role of information activities as a service component in the overall structure.

In general, however, it may be said that there are two basic alternative structures which affect the relationships between the central and sectional units. In the first, the sectional units report directly to the central unit, as 'branches' of the central unit; in the second, the sectional units are under the control of divisions or companies other than that to which the central unit reports. These structures are shown in Figure 1.

In order to study in more detail the organizational structures that are possible between these two extremes, we must look at the various information activities more closely. Can we, for instance, divide these activities broadly into two classes—those that are better undertaken by a central unit and those that are better carried out by a sectional unit? Obviously, to some extent, the economic aspects of centralization will depend on such factors as geographical separation of the various parts of the organization, but I believe that there are certain common matters one can find which are not greatly influenced by such factors.

CENTRALIZED REPORTING



DECENTRALIZED REPORTING

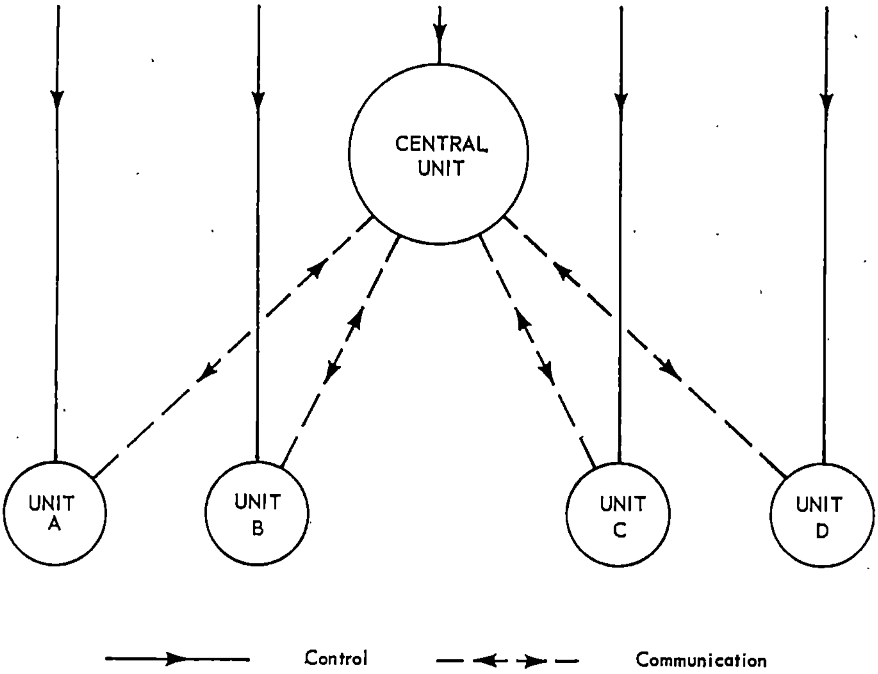


FIGURE I
(Lines of communication between sectional units and to users are not shown.)

Acquisitions

The acquisition of most types of material is usually better handled centrally. There is, at present, no cash advantage in buying books in quantity; but money can be saved on large orders for newspapers and certain classes of journal. Also, only a central point responsible for acquisition of material can keep proper control on unnecessary duplication. A proper knowledge of sources of material can best be built up centrally, resulting in quicker location; a centrally organized collection and delivery service can save both money and time.

Storage and loan

It is more difficult to generalize about the merits of centralizing the storage and loan of material. If the material is of more than purely sectional interest, better usage can result from a central holding. On the other hand, reference material must be available quickly to those who need it and this may not be possible with a central collection. Similarly, loan material of purely sectional interest may be better held in a sectional unit.

Modern methods have done much to facilitate the supply of photocopy material (either from the original or from microcopies) from centrally held collections. It is interesting to note, however, that ASTIA, which is one of the most highly developed central storage and retrieval systems in the world, has recently decided to set up regional units where material located by the central index can be obtained more quickly than from the central storage unit.

Dissemination

When we consider the dissemination of information, we find a similar pattern emerging. Information of general interest can best be handled centrally; this ensures a company-wide service. Within a specialist subject field, however, it may be difficult for a central unit to maintain the specialist knowledge needed to recognize the relevance of specialist items; this can result in the supply of irrelevant material or the failure to supply relevant material.

Indexing

Subject indexing for the retrieval of stored information is closely allied to dissemination. Here the degree of specialization and the depth of indexing must be taken into account. Should it be undertaken centrally or in a unit which is able to maintain closer contact with the users? If mechanized methods are used, cost of equipment alone will dictate the former; although there is nothing to stop a sectional unit from feeding coded information items back to a central storage and retrieval unit, and subsequently requesting searches to be made in its own field.

Staffing

In planning any organization the most efficient employment of staff must be a major consideration. Here, a central unit, preferably with some measure of control over the staffing of sectional units—or at least the ability to assist with training and career development—can be of great value. Small sectional units can all too easily provide a series of dead-end jobs of limited scope, where interest soon flags and efficiency drops. A larger central unit can open possibilities for advancement, both on the specialist and administrative side; higher calibre staff can be employed; at the same time, staff numbers can be kept down by avoiding duplication of activities in sectional units.

Experimentation

As with staff, so with the development of new or improved information techniques the larger central unit will provide more scope for experiment. Conversely, too great a degree of centralization may fail to take account of the need for experimentation in special techniques suitable for a particular specialization.

Co-ordination

If a central unit exists within the same organization as sectional units, one of its main jobs must be to co-ordinate with its own activities, in some degree at least, the activities of the sectional units. Only in this way can duplication of activities be avoided and the fullest use made of information and experience from sectional units. Unless the sectional units are under the direct control of the central unit, it may not be easy to get acceptance of this role; co-ordination is all too often looked upon as interference. Properly understood and practised, however, co-ordination of this nature can be most rewarding.

Can we now classify these activities as belonging more naturally to a central or to a sectional unit?

Central Unit	*Sectional Units*
Acquisition of material	Specialist subject indexing
Storage and loan of material of more than purely sectional interest	Storage of material of sectional interest only
Active dissemination of information of interest to whole organization	Storage of 'quick reference' material
Operation of mechanical retrieval systems	Active dissemination of information in a specialized subject field
Training and advice on staffing	Study of information techniques suitable for a particular specialization.
Study of information techniques	
Co-ordinating role in the information network.	

With these activities in mind, we can draw a new organization diagram (Figure 2), based on the 'decentralized reporting' system shown in Figure 1.

Here, the specialist information activities of the sectional units remain under the control of the specialist division or company in which the unit operates, but certain activities, such as acquisition of material, are under the direct control of the central unit. Although this brings the activities of the units into proper relationship, it would be an almost impossible organization from the viewpoint of the sectional units. They suffer under divided control, which is never satisfactory.

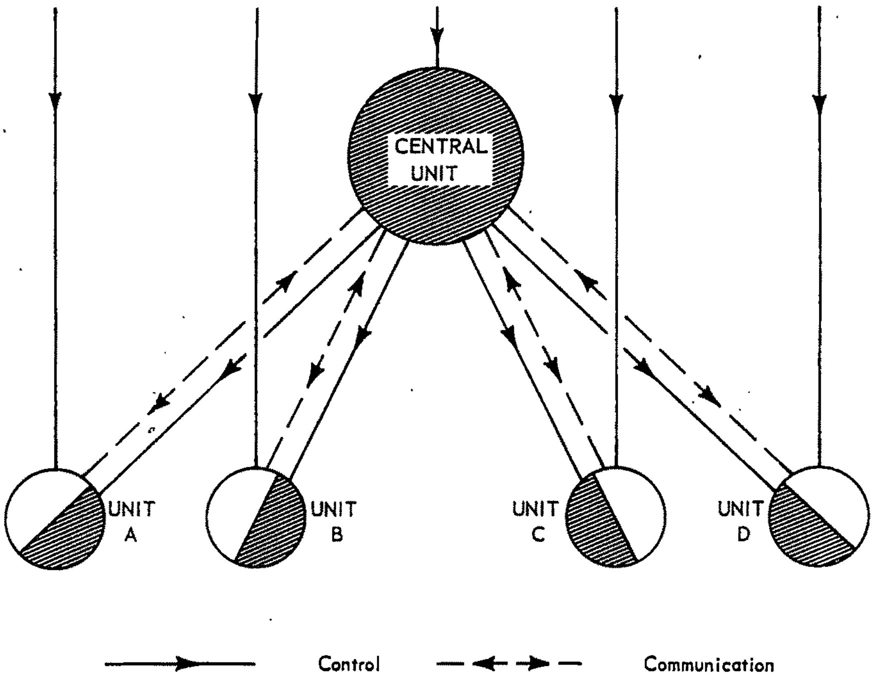


FIGURE 2
(Lines of communication between sectional units and to users are not shown.)

What then is the solution? Are we perhaps placing too much emphasis on 'control'? One of the most important of the activities of a central unit which we listed earlier was the co-ordinating role. Can co-ordination be substituted for control as a link between the central unit and the sectional units? For certain activities it undoubtedly can; staff training and the study of information techniques, for example, are activities which can be 'co-ordinated' from a central point without direct 'control' of staff employed or techniques used in the sectional units.

The library service aspects of a sectional unit's activities, however, may still under certain circumstances be better and more economically operated under the direct control of a central unit. If two sectional units are operating in different subject specializations but in close physical proximity, there would seem to be no reason why they should not share the same library storage facilities, reading space, and any reference material common to both specializations. In such a case a single sectional 'library' unit, reporting to the central unit, could serve the needs of both specialist 'information' units; thus economizing in staff, space and stock but retaining the original reporting relationship of the two sectional information units to their own divisions or companies.

Figure 3 shows such a system, with two sectional 'library' units serving four

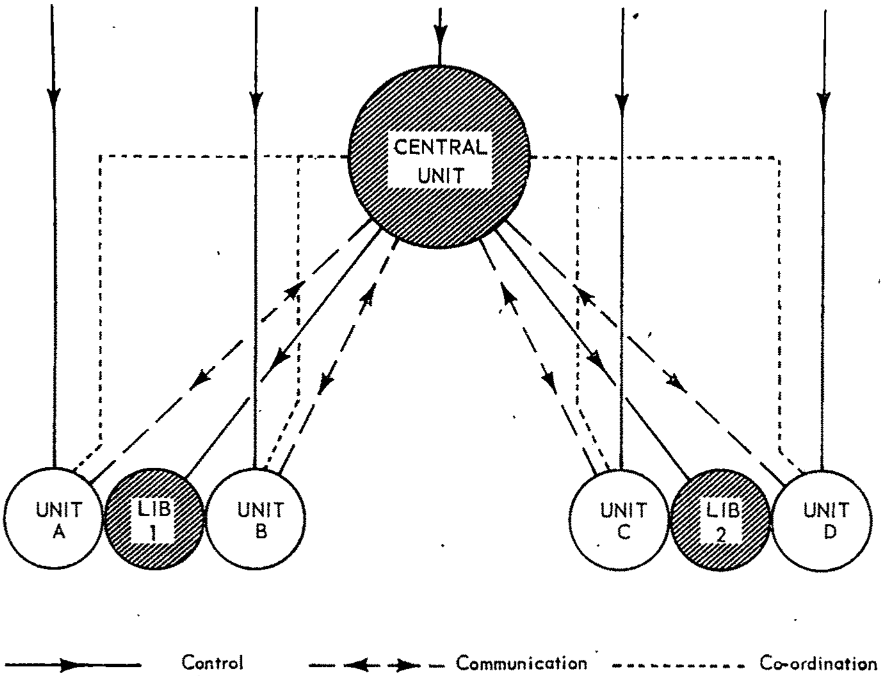


FIGURE 3
(Lines of communication between sectional units and to users are not shown.)

sectional 'information' units. Lines of co-ordination are shown linking appropriate activities in the central unit with activities in the sectional information units.

USER'S POINT OF VIEW

Up till now we have been considering the information service from the point of view of the purveyor of information. But what about the 'customer'? Let us look at our information system from his angle.

Approach to units

If a number of information units exist, all dealing in separate subject specializations, the user will presumably rely primarily on that unit which deals with his own subject. But if his needs go outside the field covered by that particular unit, is he expected to approach all the other possible units individually? If a central unit exists, should he himself approach the central unit for the information? Or should he rely on his own specialist unit to act as his agent and obtain the information for him, using the services of the central unit and/or other specialist sectional units?

There is no easy answer to this. It can be said that the user should work always through his own sectional unit, since only in this way will the unit be able to adjust its activities to suit the user's particular needs. This is, after all, the advantage of personal contact. Similarly, unless the sectional unit has knowledge of all material passed to the users served by it, even if disseminated originally by a central unit, it will be unable to exercise its most important function of ensuring that the user receives only material which is relevant to his work; and that he receives such material only once, in the most suitable form, instead of three or four times in different forms from different sources.

On the other hand, much delay can occur if all material and inquiries, even on general matters not normally covered by a sectional unit, have to be channelled through it on the way between a central unit and the user.

Here again, some compromise is needed in order to achieve maximum efficiency. Providing the subject fields or the sources covered by the units can be clearly laid down, there is no reason why dissemination of information should not take place direct to users both from the central unit and from sectional units. Similarly, sound co-ordination can ensure that an inquiry received either at the central unit or at a sectional unit is channelled immediately to the unit best able to deal with it.

Private information files

What of the user who keeps his own information files and indexes? Knox[4] has said, 'Consider asking an individual to surrender his personal files to a central information service. It is almost asking the supreme sacrifice.' He goes on to say that we must be sympathetic with this individual and demonstrate to him that an information service can give him the information he needs more effectively than his own system. This is undoubtedly true most of the time. But there remain certain cases where, by reason of particular specialist knowledge or personal contact with some source not normally available to other individuals, a personal information index can be justified.

In such cases the user must be encouraged to consider himself as a one-man sectional unit. If the relationships between sectional units and the central unit are as shown in the diagram in Figure 3, this is not difficult either for the user or for the information unit. The same lines of communication and co-ordination will exist between the 'personal' information file and the central unit as exist between a sectional unit and the central unit. The user forfeits nothing but the right to keep his information for himself alone. The central unit exercises its co-ordinating function to ensure that the fullest possible use is made of the personal information file by other users, and that the owner (as a 'sectional unit') has the benefit of advice and guidance on how best to look after it.

CONCLUSION

The problems of centralization or decentralization of information facilities are complex and are always with us. No organization can be considered as static; 'centralization' can take place by the combination of one or more sectional units, or 'decentralization' by the creation of new sectional units, all within the framework of a central and sectional unit approach.

Much of the lack of efficiency in the use of an information service is frequently blamed on the user's failure to define his true needs or to countenance any change in the established pattern, or on management's failure to initiate inquiry into information matters and to devote time and money to seeking the best solution. But those of us in the information field have perhaps given less thought than we should to the organizational side of information service as a basic element affecting all aspects of our work.

I hope that this paper has shown that the answer does not lie in either of the two extremes (one central information service or a series of sectional units) but in a carefully considered combination of resources, with sound co-ordination to ensure that the users' needs are met quickly, comprehensively, and with proper regard to cost.

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THE RELATIONS BETWEEN A CENTRAL INFORMATION UNIT AND SECTIONAL UNITS. PART II.

SOME EXAMPLES TAKEN FROM LARGE ORGANIZATIONS AND CONCLUSIONS DRAWN FROM THEM

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36th Annual Conference, Blackpool, October 1962

FOLLOWING upon Mr J. R. Stocks' paper on theoretical aspects, I should like briefly to discuss one or two examples of centralization which seem to be worthy of attention, and the first of these is the United States Armed Services Technical Information Agency, generally and more conveniently known as ASTIA. This Agency, which deals entirely with information in the shape of separate unpublished reports, receives copies of them from the three American Services and from some other sources which supply reports to these Services; it abstracts and indexes these reports, supplies photographic copies of them on request and also produces accession lists with abstracts, indexes, and bibliographies; its customers are the US Services, their contractors and nobody else, and it is in fact staffed by the United States Air Force on a repayment basis. Before ASTIA was set up there was a minimum of co-operation between the US Services so far as documentary information was concerned and now the Agency's services are far more ambitious than any one of them could contemplate separately: it has mechanized many of its operations and it has been continuously concerned to expand and improve its services, and to this end has established branch offices to give more rapid service to its scattered customers. Yet, although it gives service to all within its terms of reference who have an entitlement it receives its raw material only at the discretion of the Services, and some of these are more forthcoming than others, although it is not questioned that it provides a better service than the individual Services could.

Another object lesson could be taken from the Chemical Abstracts service. It will be recalled that some years ago, when *British Chemical Abstracts* ran into difficulties, an agreement was sought with *Chemical Abstracts* to lead to some rationalization of work. No agreement could be reached, because the American Chemical Society was convinced that the only efficient method of operation was to have the one centralized organization. *British Chemical Abstracts* has ceased publication as such and *Chemical Abstracts* has a virtual monopoly in the English language; its coverage is improved, the indexing arrangements are much better and once again there has been a substantial amount of mechanization and research into improvements to working methods. The substantial difference is that *Chemical Abstracts* does not seek co-operation—its monopoly is a financial one, and anyone who thinks he can produce a comparable service is at liberty to try to do so; in spite of the fact that the annual subscription is over £300, *Chemical Abstracts* has felt strong enough to refuse to sell separate sections until now, although *Analytical Abstracts*, for example, is probably just as good where analytical chemistry is concerned, and may be obtained for an annual subscription of three guineas.

In most instances, however, the circumstances are far more complicated than in these quite simple instances. Libraries in the Admiralty form quite a complex pattern: they differ in the sort of people they serve, in their subject coverage and in where they are situated. Thus they may serve scientists, historians, professional naval officers, stores officers or sailors; their holdings may include books on science, engineering, shipbuilding, historical matters, or firms' brochures or popular light fiction; they may be at Headquarters, at the various experimental establishments, at dockyards or in the ships of the Fleet. It will, of course, be evident that some of the possible combinations are unlikely to be needed, while subjects and people served will be strongly correlated, but none the less there are in fact many different types, as the following diagram will illustrate.

	Reference	Science	Engineering	Educational	Historical	Commercial	Fiction
H.Q.	x	x	x		x	x	
Establishments	x	x	x	x		x	
Dockyards	x	x	x	x		x	
Ships	x		x				x

FIGURE I

The diagram is not intended to be exact or comprehensive, but to show light on the possibilities of rationalization. All might be united in one organization, and this is realized to the extent that all their books and periodicals are bought through the one channel, but that is the only connection between, say, the Admiralty library at Headquarters which contains a large collection of historical and biographical material (and very little else) and a ship's library which is mainly composed of rather lurid fiction: yet even in this instance there is some overlapping in the coverage—they will have a few books in common. In other cases the overlap may be considerable, but the libraries remain quite separate because they are in administratively distinct parts of the Admiralty. At the same time there is a considerable measure of co-ordination; the Admiralty Centre for Scientific Information and Liaison may be said to supply scientific and technical information to the Royal Naval Scientific Service; in fact it also supplies books and periodicals to libraries which are outside that Service and it supplies advice, services and information to anyone in the Admiralty who asks for it, but it does not control any library but its own and its position is similar to that of the Centre for Information and Documentation in Euratom.

There is a small degree of centralized control in that all the books, periodicals, and all forms of stationery are provided by Her Majesty's Stationery Office, but that control is purely financial—a control of the money spent, and in fact the various libraries answer to different members of the Board of Admiralty. It is natural, therefore, that co-operation between them is entirely voluntary and that any attempt at dictation by any unit would be quite properly rejected.

A rather different case in point is that when the Ministry of Aviation was broken up, its central Technical Information service was retained intact and now serves both the War Department and the Ministry of Aviation.

The United States National Astronautics and Space Administration has problems rather similar to those of ASTIA, but it has tackled them in a rather different way. It has the same task of getting documents quickly to customers spread over an area as great as the whole of Europe, but its policy is to avoid competition with other agencies such as ASTIA and the A.E.C.'s Technical Information Division and actively to seek co-operation with them. The question of centralization has been studied but there is a refreshing absence of empire-building and while the scale of its operations makes machine processing of requests almost obligatory in the American context the machine records of holdings are available not only to the NASA branch offices but also to co-operating agencies. Sets of the actual documents are distributed in microform so that while the material is collected, selected, abstracted, indexed and copied at one centre, at which the machine records are produced and from which the machine records, microcopies and bibliographic material are distributed, literature searches may be conducted with the most sophisticated equipment at a number of centres, and the documents in question produced on the spot. Nor is this the most remarkable feature of the NASA Office of Scientific and Technical Information: the centralized work I have mentioned is not done 'in house' —it is done by a contractor.

The European Atomic Energy Community, generally known as Euratom, is an interesting example for two reasons—firstly because of the spread of its activities among the member countries and secondly because in 1963, 2.2 per cent of its research budget of $425 million is earmarked for its Centre for Information and Documentation (CID).

Euratom has four official languages and the CID works with existing documentation centres with notably different organizations; it will have five libraries, one of which at Brussels serves the organization's headquarters and maintains the central literature store while a smaller library in Belgium will rely on the Brussels holdings: the remainder will have their own stocks. All the libraries have to cope with all the official languages and they are largely independent, there being a 'co-ordinator' at Brussels whose responsibility it is to see that there is a reasonable degree of uniformity in the operation and development of all the libraries, that their resources are complementary to those of the national libraries and that there is a sound general acquisition policy. There is also an annual meeting of the librarians, and a plan by which the separate libraries will each build up a more or less complete collection each on a different subject: these collections will be available to all the libraries.

The various publications are produced at Brussels, and translations are made at all the establishments, but there is research on automatic translation at the Italian laboratory at Ispra while work on automatic retrieval is going on at Brussels.

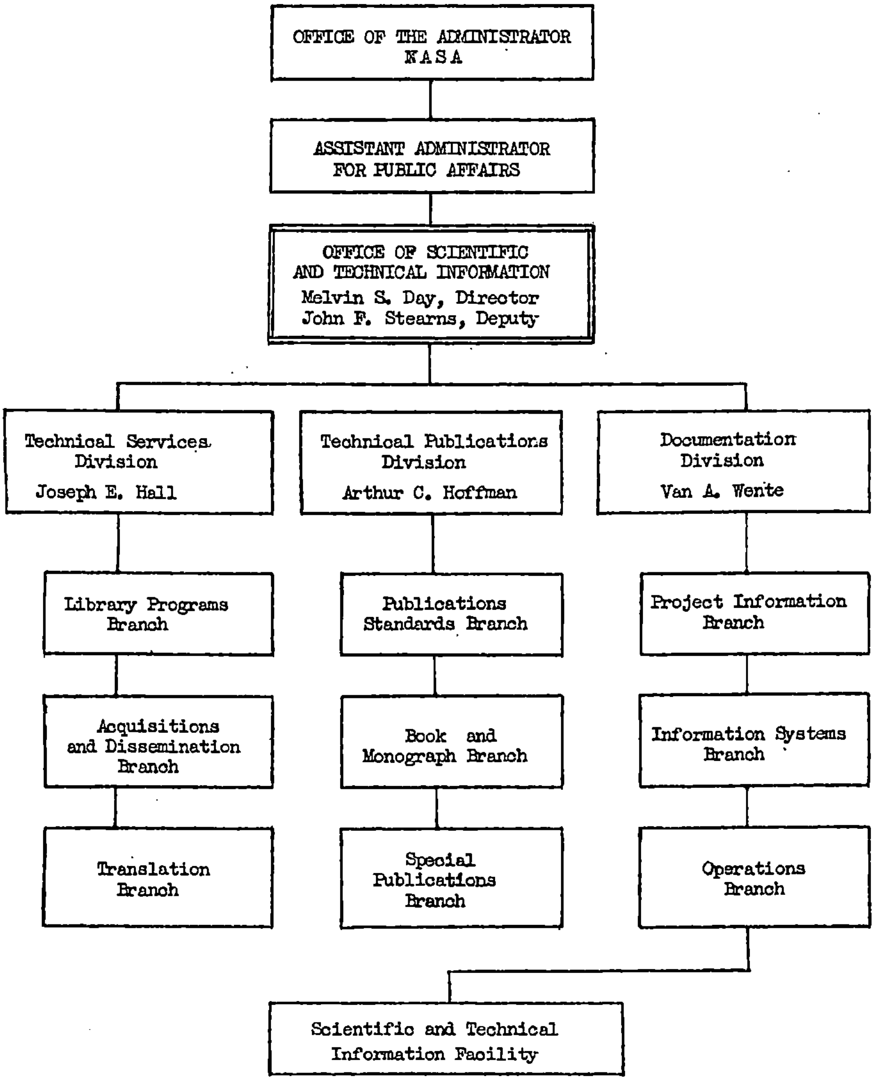
OFFICE OF THE ADMINISTRATOR
NASA
ASSISTANT ADMINISTRATOR
FOR PUBLIC AFFAIRS
OFFICE OF SCIENTIFIC
AND TECHNICAL INFORMATION
Melvin S. Day, Director
John F. Stearns, Deputy
Technical Services
Division
Joseph E. Hall
Technical Publications
Division
Arthur C. Hoffman
Documentation
Division
Van A. Wente
Library Programs
Branch
Publications
Standards Branch
Project Information
Branch
Acquisitions
and Dissemination
Branch
Book and
Monograph Branch
Information Systems
Branch
Translation
Branch
Special
Publications
Branch
Operations
Branch
Scientific and Technical
Information Facility

FIGURE 2

The one-man unit

It cannot reasonably be doubted that every working scientist is to some extent his own information unit. He may derive his raw material from his own reading or from papers supplied by his employer, but he does not go to his library every time he needs some new piece of information. If I may indulge in a piece of personal reminiscence, when I was working in analytical chemistry one of my colleagues maintained a private card index of methods which he kept up to date from his reading essentially for his own instruction, though in point of fact few weeks went by in which his colleagues did not consult him and his index when they came across knotty problems. Now this man had no more facilities than anybody else: he went to the library to see the recent journals, but they were not circulated to him and he had no special facilities for borrowing them—for it was that sort of library.

Another experience in very similar circumstances—a library which gave inadequate borrowing facilities—arose just after the last war when a number of colleagues were so much concerned with the difficulty of professional reading that I organized a club which bought the leading journals in our own field for circulation among the members and each member finally kept one or more of them to the approximate value of his own subscription. The prime requirement of effective service to the actual user necessitated such a completely automonous club in these circumstances, but everyone would have been better pleased if reasonable facilities could have been given by the library, which in fact had the necessary organization already in being.

Two problems arise: these are the question of how far it is advantageous for independent information activities to receive official support, and how far it is advantageous for the one-man unit to go before the operator finds it preferable to use the library. There can be no definite answer to either of these questions, for so much depends on the particular circumstances of each case, but as usual it may be said that in no case is the optimum likely to be reached by any extreme solution.

Some staff aspects

With a strong centralized organization there are usually a limited number of grades of staff and there are opportunities for their interchange from one branch to another; with such an arrangement there goes the opportunity for a reasonable career structure in the library–information field. Such a centralized organization has both advantages and disadvantages—on the one hand there is not the likelihood of years on end being spent on, say, filing index cards or a narrow subject specialization, but on the other, staff are apt to take a dim view of the prospect of being sent off to an establishment a hundred miles away, and they may not be at one place long enough to master effectively the technical implications of the work being done at one site.

There is much to be said for providing the opportunity of interchange between information work and laboratory work, but this is only really practical at the more or less autonomous local centre: the usual experience is that though sometimes the bench worker develops a taste for library–information work, and, much less frequently, an information worker will be accepted into a laboratory, a more highly developed interchange is very difficult to establish except in those instances where keenly sought-after expertise can be offered.

The local unit can often take advantage of local training opportunities, and there can be provision for this in a centralized organization, particularly at the lower levels, but purely local staff are seldom suitable or willing for training schemes, and there is a tendency for the local centre to be manned by people who are trained on the job as against the central unit's trend to have staff with a more generalized training. The centralized organization, also, may be able to set up its own training unit, in which the tuition is tailored to the organization's special needs.

Combinations

The question often arises in these days of what happens to the libraries of the organizations concerned when there are takeovers or mergers. There may well be a better information service in the company that is taken over than in the other, or it may be impracticable to establish an effective service at the site chosen for the headquarters of the combined organization.

In a field in which generalizations are dangerous, one may be hazarded—that it is not wise to interfere unduly with an efficient organization, and if there is one at a subsidiary site, then it could well remain there provided that there is room for expansion. Where choice of site for a central information organization is open, it is better to have it at a place convenient to the majority of its active users than at one decided by prestige, though it is essential that it should provide a good service to the headquarters: this often means that at least one branch library should be established, and in some cases the head of the information organization has his seat in such a branch library because prestige or convention requires that he should have ready access to the administrative centre; this should not prevent his exercising effective control over the central information unit, though the day-to-day running is obviously better delegated to somebody on the spot. Often enough when there is such an organization the 'front office' will have a high sounding title, but this does not obscure the fact that the true nerve centre is elsewhere.

There may, of course, be a tendency to build up the 'front office', but the example of NASA shows that this can be done as a largely administrative office, with the bulk of the actual work being done elsewhere; and this example is by no means unique. There is another side to this, however: there is a tendency in many professions for the practitioner to engage, as he advances in seniority, less and less in the exercise of his profession and more and more in administration; the 'front office' divorced from day-to-day work, apart from a branch library which is perhaps mostly devoted to administrative rather than to technical material, represents something like the end of the line, and many first-rate informers would boggle at the prospect. Some few of them would like to become administrators rather than informers, but most of them have information in their blood, and would be happiest working at their trade rather than sitting in a fine office and directing their staff from a distance. Equally, of course, the same people would resent, and rightly so, being told how to do their job by a distant administrator who was unfamiliar with the techniques involved.

Limits

It is plain enough that the limits between which one must work are on the one hand: 'every man his own librarian and information unit' and on the other hand: one universal thesaurus of all information to which all have free and equal access.

It is only necessary to state these limits to see how unreal they are. Every man has his own store of information, which he may keep in order or allow to accumulate in disorder, but few would like to rely upon their own store without having access to any larger unit. It would be convenient to have one address to which any demand for information could be sent, but most people have enough experience of dealing with large and remote organizations to cause them to resort to something nearer to hand whenever possible. It is plain that almost everyone, when confronted with a choice between these extremes, will wish to select some compromise.

In any geographically scattered organization it is almost essential to provide such a series of information units that every user will have one within easy reach, and plainly each unit cannot be self-contained: it must be able to resort to some better-equipped unit for the material it does not hold. The problems are those of the relations between the ultimate user and his local unit, between that local unit and a central unit (perhaps through some intermediate link) and between the central unit and national or other general libraries. Although the extreme links in this chain are sometimes forgotten, they are of vital importance and quite frequently they are the deciding factors in the shape of the optimum organization: if a major source of supply insists on dealing with a single contact in an organization then that contact has, willy-nilly, a distributive function and often enough a controlling function. On the other hand if the ultimate user cannot obtain satisfactory service from his local unit he may rebel against any organization which imposes its use upon him and he may come to rely entirely upon his own resources or upon outside supplies.

In the Civil Service Her Majesty's Stationery Office is the only source of supply of books and periodicals as well as of other forms of stationery, and this forms a connecting link between all the libraries and information units in the Service. It forms almost the only connecting link between many of them, and it would be absurd to think of HMSO as a central information unit for the Civil Service. Even in a single Ministry there may be a number of information units, each with its own subject specialization, whose allegiance is not to any central information unit, but to their own departmental heads; when this occurs there may be co-operation between the units and there may not—it depends upon the personalities concerned and upon whether one of the units is in a position to act as a leader.

Conclusions

Enough has already been said to indicate that neither of the authors is convinced that the best solution is either to have a number of small completely

	Centralization	Decentralization
Advantages	Economy	Speed of action
	Efficient use of staff	Competition
	More effective co-operation	Tailoring of services to local needs
	Possible provision of expensive equipment	Maintenance of subject interest
	Ease of establishing a comprehensive collection	Maintenance of interest of the ultimate user
Disadvantages	Excessive administration	Duplication of stock
	Comparative slowness of operation	Risk of use of poorly trained staff
	Remoteness of the ultimate user	Lack of uniformity
	Resentment of central domination	Tendency towards excessive local pride

FIGURE 3

autonomous local units nor to have one massive central unit to which all matters concerning technical literature are referred, but when it comes to selecting an optimum point between these extremes there are as many difficulties as there are in finding the winner of a horse race before the event.

In Figure 3 are set out some advantages and disadvantages of each of the tendencies towards centralization and local autonomy, and I should emphasize at once that I have looked at them from an angle different from that of my colleague, and that not only are these to a large extent complementary, but also none of them can be regarded as absolute or in isolation. The centralized system is bound to be slower than the autonomous unit *if they are otherwise similar,* and local units *can* be quite uniform although they are autonomous.

There are advantages in the centralized system which are unobtainable without the centre, just as there are advantages in the local units which are unobtainable at the centre. Let it be accepted, then, that in our imaginary large organization there will be a central unit and a number of local units, and the question remains of the relations between them.

I shall put forward the personal contention that the finance available to the whole should be divided by the central unit, that the appointment of senior staff should be organized by the central unit and that of the junior staff locally, and that the systems to be used should be decided centrally with the assistance of a consultative committee on which all should be represented. Premises must be allocated locally although there should be provision to ensure their adequacy just as there must be assurance that the financial cake is large enough to provide the services which are necessary.

Another generalization in which I have some confidence is that leadership is essential, and leadership does not mean dictatorship. In any large organization there must be rules, but the rules will only work if they are accepted by the rank and file; co-operation is the mainstay of successful working and it depends more than anything else on consultation: the forms of democracy should be observed, but there must be somebody who plans and leads.

A COMPUTER-INTEGRATED SYSTEM FOR CENTRALIZED INFORMATION DISSEMINATION, STORAGE, AND RETRIEVAL

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36th Annual Conference, Blackpool, October 1962

THE age-old goals of libraries and librarians are recording knowledge for posterity, and the arrangement of such recording in a form in which future users may have easy access to the material. The IBM Technical Information Center attempts to achieve these same goals by using tools which promise to become increasingly useful in this work.

This report will set out the specific objectives which are desired in our system. Then, it will present details as to how these objectives are being achieved, from theoretical and practical viewpoints. Also, acquisition of input material, abstracting and indexing, preparatory processing, machine programmes, automatic information dissemination, abstract and index bulletin, and customer-initiated retrieval will be discussed in detail.

INFORMATION REQUIREMENTS

In any library-like system which manipulates information in such forms as documents and books, these fundamental questions must be answered:

> Shall the attributes of the item, as well as the complete item, be manipulated during processing? Or shall only the attributes of the item be manipulated in a primary fashion, with the manipulation of the item itself separately, in a secondary fashion?

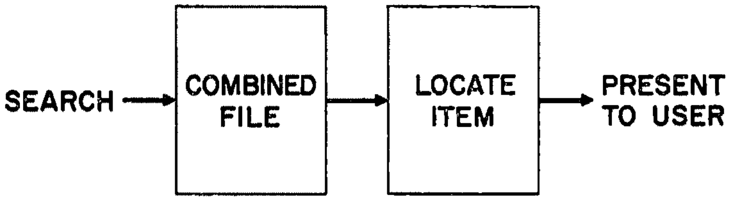


FIGURE 1. *Items and attributes combined*

As an example, one might envision a library of books which have the catalogue card information printed on the title page, or on the reverse thereof. Thus, each book contains all its attributes (author, title, subject entries, date, etc.). One method of retrieving information from such a library would be to examine each book to see if it contained the attribute desired (say a particular author) and when this attribute is found, immediately the item itself is found and at hand (Figure 1).

Another method of organizing this collection of books is to assign to each item a control number (an accession number), and in a separate grouping organize all the attributes of the items. Thus, an author file might be established, as well as a subject file, a date-published file, a height-of-book file, a colour-of-binding file, etc. Now, when the desired attribute is found, it is necessary to make a second effort to locate the item by its control number (Figure 2).

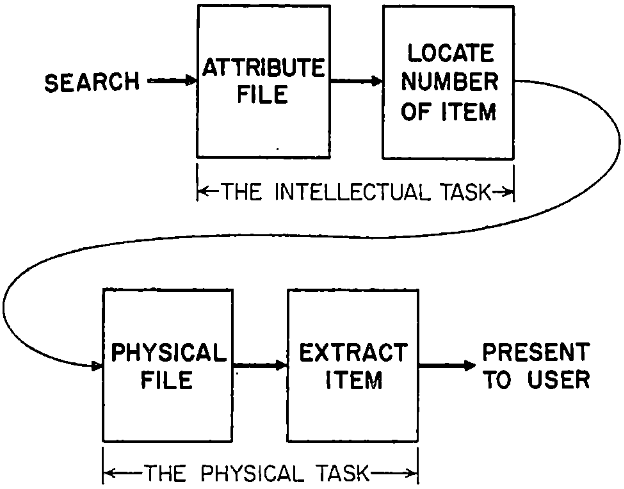


FIGURE 2. *Attributes separated from items*

Historically, only the smallest of libraries have been able to operate in the former method; most libraries of any size have used the latter method, with the attributes being organized in the form of indexes, either in lists or on cards. This has been true because of the sheer physical labour involved in the manipulation (searching) of the materials. Practical systems have evolved which place the physical items in a basic sequence, with entries from all other attributes made available by cross-referencing systems. The basic sequence might be by accession number or by author, for example. In point of fact, a great many collections are sequenced by classification number (with perhaps some special exceptions for under- and over-sized items); all other entry points are made available from a cross-reference, usually the card catalogue.

Given a particular attribute (say, author), the searcher consults the catalogue, determines the classification number (which also gives him the shelf position), and then is able to find the item itself.

However, where a new form of storage is envisioned, all these factors must be reconsidered. If micro-image storage is considered, it might be quite feasible to manipulate not only the attributes, but also the full item itself. Using microstorage, it might be possible to search the file for a particular author and, having found the desired author, discontinue the searching process and present the full document to the searcher. This type of system would have the obvious advantage of eliminating the secondary operation of looking *again* to find the item via the file-sequence number.

Because of the advantages of this latter method of operation, several systems using microstorage have combined the attributes of the item with the item itself in a complete file. Examples of these are the Bureau of Ships Rapid Selector System[1, 11] and the FMA File Search System.[2]

However, there are four considerations which favour the 'separated attribute and item' concept over the 'combined attribute and item' concept:

1. In the library-like information systems, the items tend to have a rather large number of attributes, from perhaps three or four to fifty or one hundred. This makes the searching problem more complicated, because suitable codes must be arranged on the film to handle say, six authors, thirty words of title, five previously assigned identification numbers, 'n' subjects, etc. The film coding becomes more and more complex, if attempting to solve the total problem, because the complete document image and all the coding are being carried along during all manipulative operations.
2. The cost of such a system rises sharply. All the complex operations will add a considerable cost to each part of the system. If further demands for high-speed operation are made, the cost becomes even more prohibitive.
3. A considerable amount of attribute-manipulating machinery is already commercially available in a wide range of sizes and capacities. This equipment, usually considered as data processing machinery, is well suited to assisting with the intellectual task. Using this standard equipment, as opposed to special purpose equipment, provides much more system flexibility and at a lower cost.
4. Having separate intellectual and physical sub-systems allows the choice of storage medium, completely independently for each. No interlocking constraints need be placed on either sub-system and both may then be optimized independently.

For those reasons, it seemed that a practical and reasonable-cost system must be divided into two parts:

1. The intellectual task: ascertaining that one or more items meet the search criteria, either partially or completely, and
2. The physical task: once given the file number, the actual extraction of the item from the file for the purpose of presentation to the user.

In our system, the intellectual task is approached by utilization of punched cards, magnetic tapes, and the machines which can process them. The physical task is approached by utilization of 100-foot cartridges of 16 mm. roll microfilm, and reader-printers which can position the film and present it to the user for viewing and/or making an enlarged copy.

System objectives

The overall objectives of our technical information centre are to provide timely, accurate, and complete information to our engineering and scientific personnel. In effect, we want 'to get the right information to the right man at the right time'. Early in our study we recognized that these objectives, in a large and decentralized organization, take many forms. A brief study of

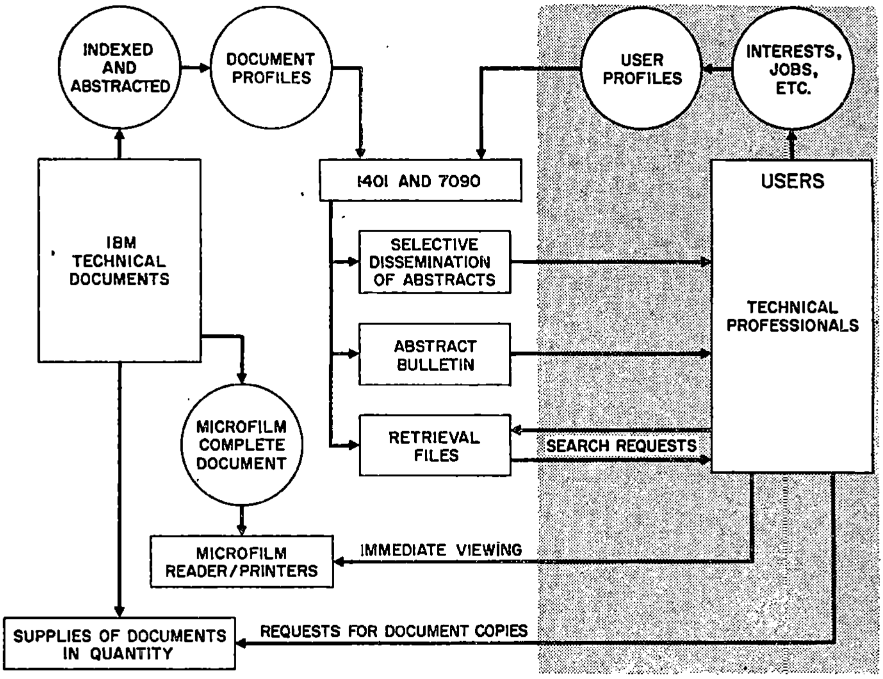


FIGURE 3. *Diagram of information flow in Technical Information Center (TIC)*

individual objectives will help to frame system requirements. Figure 3 shows the overall plan of the system designed to meet these objectives.

1. Any technical person should be able to put a query to the total file, with a minimum of time and trouble to himself. If he puts a sensible question to the system, he has a right to expect a sensible reply. Contained in the reply there should be more, probably, than merely a list of selected documents. The reply should, of course, contain the file number of the documents, but more importantly should contain: *a,* the title, *b,* the author, *c,* the date of publication. Perhaps it should also present him with an abstract of the work and with the index terms assigned to the document, so that he might have useful clues as to other searches that would prove profitable.
2. The main library or information centre should be involved in the query-reply situation, so that it can optimize the query by re-wording, suggesting new terms, and in general by establishing a meaningful man-to-machine relationship. This is exceedingly important because the library will have the benefit of an ever-growing, cumulative fund of knowledge of the best methods of using the system. Raw communication between the user and the machine section of the system appears impractical and unfruitful at this time.
3. Branch libraries which are remote from the central library should be able to write, phone, or cable their requests to the system, via the central library.

4. The remote libraries should have a means of using the output of the system on their own premises, without communicating with the central library. That is, they should have provisions to conduct searches of their own, even if the work required per search is extensive and/or time consuming. They might be willing to trade effort for time. Having this capacity means that there are a number of ways of utilizing the overall system output, thereby providing fewer restrictions.
5. In a similar way and for similar reasons, an individual engineer or scientist should be able to use some portion of the system at his desk. Because large-scale 'real-time, on-demand' computer availability cannot usually be justified for these functions alone, computer searching generally will be provided on an overnight or perhaps eight-hour basis. If the man wishes to check for some (although perhaps incomplete) information immediately, the system should allow him to do this, either at his desk or in the library.
6. Having located some promising references, he should be able to see the full documents in a matter of hours or, preferably, minutes.
7. The total document file should be stored in as small a space as is practical.
8. Finally, and perhaps most importantly, information concerning each new document entering the system should be brought automatically to the attention of those to whose field the document relates.

INPUT TO TECHNICAL INFORMATION CENTER

Input to the IBM Technical Information Center consists of all IBM technical documents. This rather simple statement has broad and deep implications for those of us who are familiar with the publications output of a large industrial concern. What, indeed, does a 'technical report' consist of?

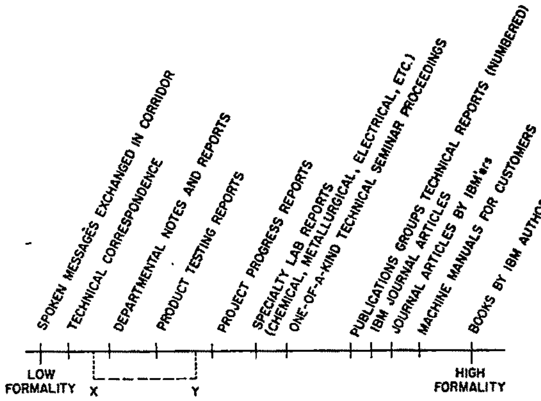

SPOKEN MESSAGES EXCHANGED IN CORRIDOR
TECHNICAL CORRESPONDENCE
DEPARTMENTAL NOTES AND REPORTS
PRODUCT TESTING REPORTS
PROJECT PROGRESS REPORTS
SPECIALTY LAB REPORTS (CHEMICAL, METALLURGICAL, ELECTRICAL, ETC.)
ONE-OF-A-KIND TECHNICAL SEMINAR PROCEEDINGS
PUBLICATIONS GROUPS TECHNICAL REPORTS (NUMBERED)
IBM JOURNAL ARTICLES
JOURNAL ARTICLES BY IBM'ers
MACHINE MANUALS FOR CUSTOMERS
BOOKS BY IBM AUTHORS
LOW FORMALITY
X
Y
HIGH FORMALITY

FIGURE 4. *Degree of formality in information exchanges*

Figure 4 shows some publications plotted along a scale of degree of formality of publication. Most formal of all are the books, journal articles, and machine-operation manuals. Next, are the formal technical reports and company seminar proceedings which are usually processed through a technical editing department. This presentation is considered a formal technical report.

Then, in decreasing degree of formality, there occur a great number of publications and information exchanges. Probably the least formal exchange of information occurs when two technical personnel meet in a corridor of the laboratory. One asks, 'Have you found the trouble with the xyz device?' The other replies, 'Yes, we had to reduce the percentage from 80 per cent X to 35 per cent X.'

While that certainly represents information which may be of some future use to a technical person, it appears outside the practical realm of storage and manipulation with present technologies. Having studied this problem of formality, we decided to draw the line somewhere in the area of XY, Figure 4. Note that correspondence is not included. If technical correspondence is of the form type which includes periodic project progress reports, with technical content, it will be considered seriously for the system.

Even though we have not drawn a sharp line between what shall be included or excluded, we do have a first approximation of the type of material we desire. We will include such things as reports issued by chemical, metallurgical, and electrical laboratories; research reports of all types; technical manuals written for customer-engineering maintenance; and similar material which we acquire through the various company communication channels. By working closely with the libraries in the various divisions, we feel quite satisfied that we shall be able to locate and acquire essentially all the technical output of the company.

INDEXING AND ABSTRACTING

Indexing

The indexing of all reports (as well as profiling all personnel in the dissemination system) is being done manually at present. The indexer, or perhaps more correctly the analyst, scans the abstract as well as the document itself, and assigns to the document those descriptors which he feels portray the true meaning of the document. These descriptors, which we might also call index entries or subject headings in a rather loose fashion, need not necessarily be mentioned in the abstract or the document. They may be assigned from the indexer's own knowledge.

All the descriptors are taken from an authority file, *Chemical engineering thesaurus*[21] plus a supplement which we have created and are maintaining. The supplement contains those terms which are common in our company, but perhaps not elsewhere, and all those terms which are code names for various projects, such as WALNUT. We have found *Chemical engineering thesaurus* a very workable tool.

This paper is not the proper place to discuss the theory and practice of indexing at great length. However, some interest in our indexing philosophy may be assumed, so a brief summary will be given. First, we had considered and rejected any classification scheme as a tool for storage and retrieval of information. To a large extent we agree with the point of view of R. Moss in his paper in *Aslib Proceedings* earlier this year.[3]

We feel that classification has a place in many systems, but that the chief advantage it offers is the ability to browse through related material. It has the disadvantage that a given item can be placed in one position only in the classification. If one begins to allow the item to carry more than one classification number, one has, in essence, codified the original concepts, which are, in fact, the subjects. We might assume that a report contains information on the following three subjects in a hypothetical classification scheme:

48.M3.791	Magnetic Tape Writing Heads
48.M3.792	Magnetic Tape Reading Heads
48.P7.405	Physics of Magnetic Recording

If a 'one number only' classification scheme is used, one must choose the apparently best number, and waste two valuable retrieval entry points. If all three numbers are assigned, one has merely assigned a numeric code to three subject headings (or index entries).

That is not to say that the subject headings, or descriptors, should not be conceived in and derived from a classified arrangement. As Farradane points out,[4] a classification structure shows clearly both the horizontal and vertical relationships among the descriptors.

It was this line of reasoning which led us to consider the use of *Chemical engineering thesaurus*. Having decided to use the words themselves as our entries, we examined various word lists, subject heading lists, and thesauri. We decided against making our own list because of the immense difficulties in pulling related terms together, weeding out synonyms, etc. *Chemical engineering thesaurus* has a very good arrangement in which vertical relationships are shown, as well as horizontal. This is a sample of the structure:

ALGEBRA		
	PO	MATHEMATICS
EQUATIONS		
	RT	MATHEMATICS
MATHEMATICAL		
	SEE	MATHEMATICS
MATHEMATICS		
	SF	MATHEMATICAL
	GT	ALGEBRA
	RT	EQUATIONS
	RT	STATISTICS
STATISTICS		
	RT	MATHEMATICS

The abbreviations are:

GT	Generic To (for downward relationships),
PO	Posted On (for upward relationships),
RT	Related Term (for approximately horizontal relationships),
SEE	See,
SF	Seen From.

Chemical engineering thesaurus also represented a rather good compromise between the strict Uniterm and the classic form of subject heading. The original form of Uniterm allowed only derivation of terms, not assignment; also, terms were not to be maintained or used in any sort of 'descriptor authority'. Both of these seemed severe disadvantages, which weighed against the seeming usefulness of concept co-ordination. On the other hand, conventional subject headings often seemed long and cumbersome, they appeared to be so inflexible that retrieval of pertinent information might be overlooked.

For example, the magnetic-tape example discussed earlier might have assigned to it the following descriptor terms (all of which are from *Chemical engineering thesaurus*):

TAPES
MAGNETIC
HEADS
MAGNETISM
PHYSICS
WRITING
RECORDING
READING
SENSING
DEVICES

Without the use of identifying roles, some false co-ordination is possible. However, some simple rules, such as not searching for less than three terms, can eliminate many problems. And we believe with J. Negus[5] that the problem of 'false holds' is far more serious than the problem of 'false drops'. Thus, in the magnetic-tape example above, there exist 120 combinations of terms taken three at a time. Even though some of these are nonsense combinations, they will cause no trouble to the system unless nonsense questions are asked.

In summary then, the use of the Thesaurus gives us the following useful features:

1. A freedom to index concepts in depth, so that all the major, and often the minor, ideas in the report can be covered, with the knowledge that these ideas can be retrieved later by the co-ordination of the various terms;
2. A well thought-out arrangement of descriptors providing thought stimulation by the display of related terms;
3. A master word list to minimize the semantic problems, and to give us word control.

The descriptors for actual documents can be seen in Appendix A. There are usually from ten to twelve descriptors, with the range being from eight to thirty or thirty-five. There are two classes of descriptors, primary and secondary. Primary descriptors are the main subjects of the document; they are used to prepare the index pages for the announcement bulletin (Appendix A). Secondary descriptors provide entry points to materials in the document which are useful but perhaps not treated exhaustively; they are not used in the manual index, but are recorded on magnetic tape together with the primary descriptors for machine searching. This provides the ability to make an extremely deep search of all material in the system, because a complex question can be set up for machine search.

A quarterly cumulation of the primary descriptors will be made and printed out as a quarterly index similar to Appendix A.

Abstracting

Abstracts are entered in the system for all documents. Sometimes the abstract that is part of the document can be used; often, it may require some minor revision. Occasionally, a completely new abstract will be written.

Because the entire abstract is keypunched into IBM cards, some care is needed on two points: *a*, the abstract should be reasonably concise; *b*, no special symbols may be used. In general, we try to use a newspaper style in our abstracting (sum up the document in the first sentence or two). Further statements then amplify the material radially, as it were, rather than sequentially. This is sometimes in sharp distinction to the report itself, which has a tendency to begin with, 'The glassware was taken down from the shelf and cleaned. Then . . .'

At present, abstracts average about seventy-five words. The system has the capacity to accept abstracts of approximately 750 words.

The special symbol problem is handled by writing out the phrase, as if it were being discussed over the telephone. Thus, R_n becomes 'R sub N', and n^5 becomes 'N to the 5th'. While cumbersome at times, this general approach appears to provide clearly understandable information to our readers.

PUNCHED CARD PREPARATION

After the indexing and abstracting have been done, the documents themselves are channelled off into the microfilming operation. The index and abstract information is punched into cards according to the following scheme.

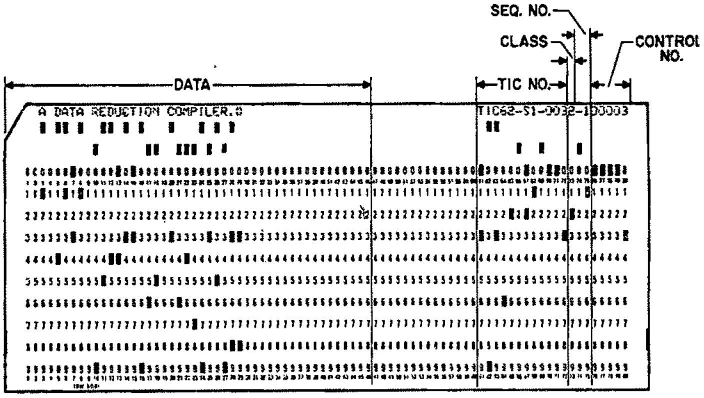
(For those readers who are unfamiliar with punch card and data processing terms, an excellent series of four brief articles appeared in *Special Libraries*.[6] Several IBM publications[7, 8] are also useful as introductory material.)

A small deck of punched cards is prepared for each document. The data are recorded for the document in such a way that each data item can later be extracted and manipulated. This decklet of punched cards becomes the basic machinable record of each document. These decklets of cards can be used for many purposes: author indexes, subject indexes, index cards, and on to as many usages as the mind can imagine. If desired, the cards can readily be converted to magnetic tape and processed at high speed. The point to be remembered is that once information is recorded on punched cards, all the simple and complex data-processing machinery can be brought into play. The fundamental difference in *typing* a record on a card as opposed to *keypunching* a record into a card is that the information on the typed card cannot be rearranged or manipulated into different forms without additional manual effort. The punched-card information is available for many uses via machine manipulation without manual effort.

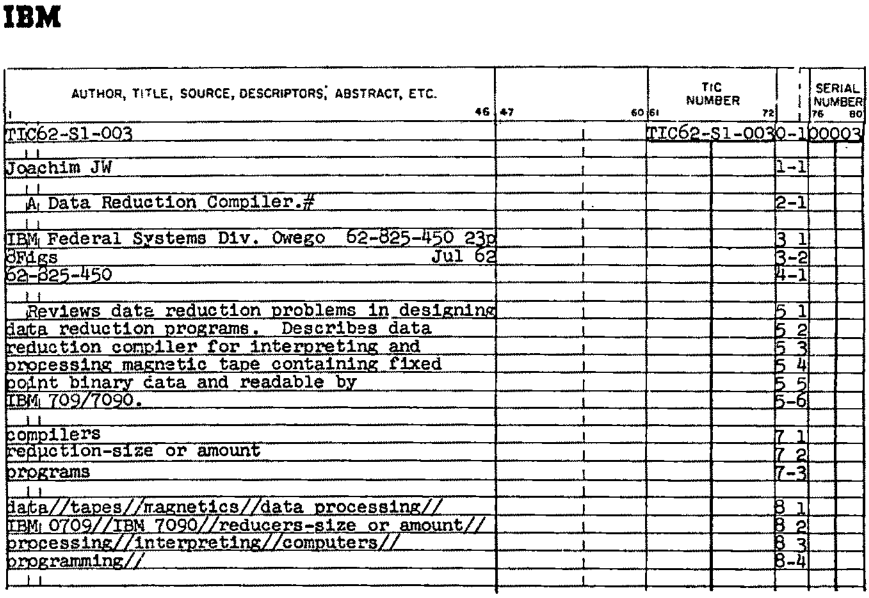
One of the principles of machine processing of data is that suitable 'tags' must be attached to the data so that proper identifications can always be made. For example, the computer must be provided with a method for being able to recognize that a particular string of words represents a title, as opposed to an abstract or a subject heading. In our system, this identification is achieved by recording a class or type number together with each individual piece of data.

This recording should be and is done in as unbiased a fashion as possible, so that no limit is placed on later usage of the punched-card records or their equivalent in magnetic tape form.

Figure 5 should be consulted to see the various cards. A typical card of the set is shown in full. The table then shows the complete punching which would



A. Typical card



IBM

AUTHOR, TITLE, SOURCE, DESCRIPTORS, ABSTRACT, ETC. 1 46	47 60	TIC NUMBER 61 72		SERIAL NUMBER 76 80
TIC62-S1-003		TIC62-S1-003	0-1	00003
Joachim JW			1-1	
A Data Reduction Compiler.#			2-1	
IBM Federal Systems Div. Owego 62-825-450 23p			3 1	
8Figs Jul 62			3-2	
62-825-450			4-1	
Reviews data reduction problems in designing			5 1	
data reduction programs. Describes data			5 2	
reduction compiler for interpreting and			5 3	
processing magnetic tape containing fixed			5 4	
point binary data and readable by			5 5	
IBM 709/7090.			5-6	
compilers			7 1	
reduction-size or amount			7 2	
programs			7-3	
data//tapes//magnetics//data processing//			8 1	
IBM 0709//IBM 7090//reducers-size or amount//			8 2	
processing//interpreting//computers//			8 3	
programming//			8-4	

B. Complete data for one report

FIGURE 5. *Punched card preparation*

appear in all cards. The card fields will be explained, proceeding generally from right to left.

Columns 76 through 80 contain a 5-digit, continuous, consecutive serial number. This is generally called the control number by computer people and the accession number by library people.

Column 73 provides the type number, and will be punched according to the following table:

Leader (shelf key)	0	Publisher's number	4
Personal author	1	Abstract	5
Title	2	Primary descriptor	7
Source	3	Secondary descriptor	8

Other codes not presently in use by TIC, but assigned for standardization in future use, are:

Corporate authors	1 (XX)	Bibliographical or personal references	6
Series titles	2 (XX)		
Full text	J	Holdings	9

Columns 74 and 75 provide the card-sequence number within type, allowing as many as 99 cards within each type. A card punched 512 in these columns would be the twelfth abstract card. Note that for each type the sequence begins again at 1.

Columns 61 to 72 provide tne TIC identification number. This is not absolutely required, because the same number appears in the type 0 card, but it has proven to be a convenience.

Columns 1 through 60 provide the field into which all variable data will be entered (information such as author, title, abstract, etc.), as opposed to control information which is punched in columns 61 through 80.

At present, in our system columns 47 through 60 are left blank in all cards. While it may seem wasteful of space and money to do this, we believe that it is not. The space on the cards is rather one of the most inexpensive items in the whole system, and this apparent waste provides the following significantly useful feature.

Almost all IBM printing machines have been standardized at a horizontal spacing of ten characters to the inch. This means that a 46-column printout will occupy 4.6 inches in the horizontal dimension. This allows 3 in. × 5 in. cards to be used for direct printouts without need for photo reduction. While our TIC operation does not create any 3 in. × 5 in. cards at present, we recognize that in certain circumstances this direct-printing feature would be useful and provisions have been made for it. An article describing in detail a method for direct production of 3 in. × 5 in. catalogue cards via an IBM system has been published by R. E. Durkin and H. S. White,[9] librarians at the IBM Kingston, New York, engineering laboratory.

In summary then, the approach here is to keypunch the various pieces of information into the decklet of cards with unique, machine-readable identifications.

In actual practice, the variable information is keypunched by the typist into columns 1 through 46 and, except for the first card, into columns 73 to 75. For the first card only of each decklet, the TIC number and the accession number i columns 61–72 and 76–80 are keypunched by hand but thereafter are carrie from card to card by the automatic duplicating feature of the keypunch. Ski ping columns 47–60 also is done automatically.

A number of conventions have been established to maintain consistency data recording. A few of these are worth mentioning. Both title and abstra are indented by leaving the first two spaces (columns) blank in the first title an abstract card. Author's surname is given first, followed without punctuatio by a blank column, then initials without a space.

Primary descriptors are entered, one to a card, beginning in column on secondary descriptors are entered one after another on the same card, but ar separated by double slashes. No word may be broken between two cards. A date always must be given (assigned by best estimate if necessary) in columns 41 to 46 of the last Type 3 card. In the abstracts, the period at the end of a sentence is followed by two blank columns.

SELECTED DISSEMINATION OF INFORMATION (SDI)

The basic concept of selective dissemination of information is not new to the librarian. For many years he has been alerting customers to new material which enters the library because he knows that such material will probably be of interest to them. Thus, when a new book on cryogenics enters his system, he attempts to mention the arrival of the new material to the appropriate scientists.

The publication of a library bulletin is another effort along these lines. The library publicizes its new acquisitions and makes them known to its clientele.

The problems arise in that the sheer volume of possible connections between new items and possible users become overwhelming. It is impossible for the librarian and his staff to know all the interests of all of the scientists; it is impossible for them to keep up with the changes which occur from day to day. Also, the problem of the scientist using the library bulletin is one of 'non-selectivity'; that is, he must browse through all the bulletins or at least those sections which seem to appeal to him.

H. P. Luhn[10] has approached this problem with the suggestion that a machine system might have success in matching the interests of the user with the content of a document. In effect, he suggests that by profiling each customer in the system (the equivalent of an indexing operation on the man), it is possible to set down a list of subjects which would be of interest to the man if a document were to contain these subjects. In a less formal manner, this is what the librarian does when he remembers that Scientist A is interested in cryogenics and that Scientist D is interested in magnetics. In effect, he has indexed each of his users in his mind by assigning subject headings to them. Now, when each new document enters the system and is indexed, the subject terms assigned to it are compared with the subject terms assigned to each man in the system (Figure 6). If a sufficient degree of match is noted, there is a good probability that this particular customer might like to know of the existence of particular documents. If no match occurs, or a very low degree of match occurs, this customer is probably not interested in the documents.

In our Technical Information Center, users are profiled and are assigned subject headings which, of course, are taken from *Chemical engineering thesaurus* nd the working supplement. The assignments of terms are made by an nformation specialist in TIC after the users have filled out a questionnaire which lists job activities, educational background, and summary of interests. Quite often, a personal interview is arranged between the information retrieval specialist and a customer. The number of terms used presently varies from approximately fifteen to fifty terms. The average is approximately twenty-five terms.

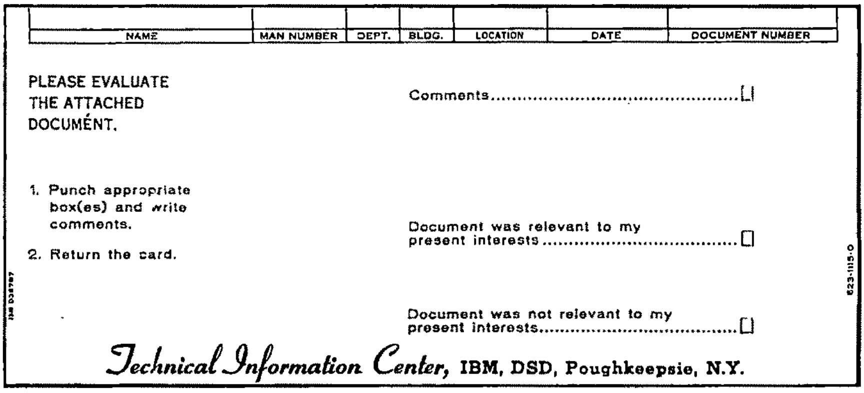
PERSONAL PROFILE DESCRIPTORS		DOCUMENT DESCRIPTORS (SI-003)	
ARITHMETIC	OUTPUT	COMPILERS	MAGNETICS
CODING	PROCESSING	COMPUTERS	PROCESSING
COMPILERS	PROGRAMMING	DATA	PROGRAMMING
COMPUTERS	PROGRAMS	DATA PROCESSING	PROGRAMS
COMPUTING	ROUTINES	IBM 0709	REDUCTION-SIZE OR AMOUNT
DATA PROCESSING	SEQUENCE	IBM 7090	REDUCERS-SIZE OR AMOUNT
INPUT	SORTING	INTERPRETING	TAPES
LANGUAGE	SYSTEMS		
MATHEMATICS	TAPES		
MULTIPROGRAMMING			

Personal profile descriptors	19	Threshold "P"	30%
Document descriptors	14	Actual, 7/14	50%

FIGURE 6. *Descriptor comparison for selective dissemination of information (SDI)*

All profiles for customers of our SDI system are keypunched on cards and then entered on magnetic tape. This is essentially a one-time operation, but we expect frequent corrections as we learn how to optimize the system. Then, once a week, the information which has been entered on magnetic tape for that week's documents is compared against the profile tape. Whenever the P factor (rounded off to the nearest whole number) is equal to or greater than the pre-set P factor for that customer, an output notification card is punched from the IBM 7090.

The P factor is defined as the ratio of the number of matches (between customer profile and document index) divided by the number of terms in the document. In our system, P factors ranging from 25 per cent to 40 per cent are used. Assume that a document has twelve index terms assigned to it. If a threshold P factor of 30 per cent has been assigned to a man, it can be seen that it will be necessary for four of the descriptors to match between the document and the profile. This would result in a 33 per cent match and would exceed the threshold 30 per cent match. The number of terms assigned to the document has considerable bearing on which documents will exceed the acceptable threshold. Therefore, we have standardized on the assignment of not fewer than eight descriptors to a document. On extremely simple, short documents, this requires some use of synonyms and near-synonyms but the problem is not at all severe. This technique has overcome an earlier problem in which only



NAME	MAN NUMBER	DEPT.	BLDG.	LOCATION	DATE	DOCUMENT NUMBER

PLEASE EVALUATE
THE ATTACHED
DOCUMENT.

Comments.. ☐

1. Punch appropriate box(es) and write comments.
2. Return the card.

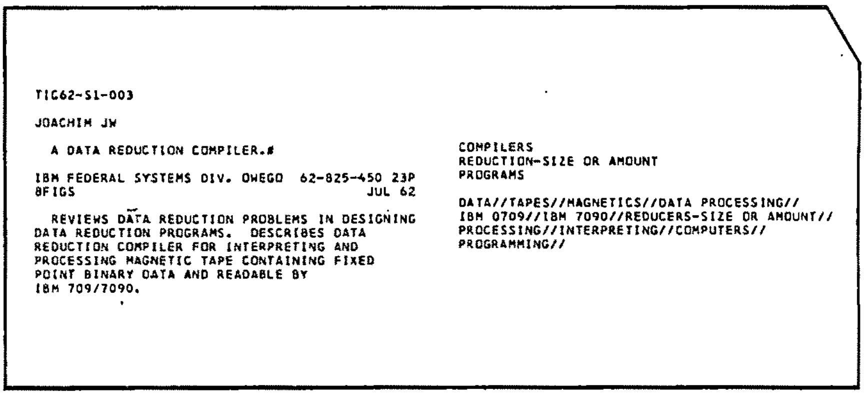
Document was relevant to my present interests.................................... ☐

Document was not relevant to my present interests.................................... ☐

Technical Information Center, **IBM, DSD, Poughkeepsie, N.Y.**

623-1115-0

FIGURE 7. *Notification card*



```
TIC62-S1-003

JOACHIM JW

  A DATA REDUCTION COMPILER.#                         COMPILERS
                                                      REDUCTION-SIZE OR AMOUNT
IBM FEDERAL SYSTEMS DIV. OWEGO  62-825-450 23P        PROGRAMS
8FIGS                                      JUL 62
                                                      DATA//TAPES//MAGNETICS//DATA PROCESSING//
  REVIEWS DATA REDUCTION PROBLEMS IN DESIGNING        IBM 0709//IBM 7090//REDUCERS-SIZE OR AMOUNT//
DATA REDUCTION PROGRAMS.  DESCRIBES DATA              PROCESSING//INTERPRETING//COMPUTERS//
REDUCTION COMPILER FOR INTERPRETING AND               PROGRAMMING//
PROCESSING MAGNETIC TAPE CONTAINING FIXED
POINT BINARY DATA AND READABLE BY
IBM 709/7090.
```

FIGURE 8. *Abstract card*

four or five descriptors were assigned to a document, and only one or two hits resulted in sending the document to the customer.

The notification card may be seen in Figure 7. This card is merged with a preprinted abstract card (Figure 8) and inserted in a window envelope in a Frieden envelope-stuffing machine. The abstract cards contain all the document summary information which was previously punched.

The customer then receives the envelope bearing the notification card and the abstract card. He scans the abstract card, which he may keep or destroy, and he punches a response on the notification card with his pencil or pen. These responses are in the form of pre-scored IBM Port-A-Punch* holes, which allow the responses to be machine-counted and analysed later at TIC, when the customers have returned their pre-addressed cards.

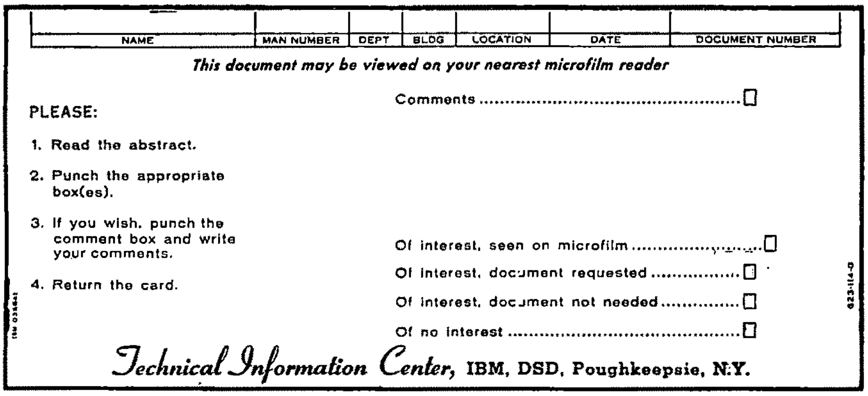
---

* Port-A-Punch—a registered trade name.

As can be seen, the possible responses are: *a,* comments, *b,* of interest, seen on microfilm; *c,* of interest, document requested; *d,* of interest, document not needed; *e,* of no interest.

It should be understood that the term 'of interest' is being used in the sense of 'related to my work', 'in my field', 'material on my subject,' 'covers a subject I am working on', or 'concerns the same kind of work I am doing'. The fundamental assumption is that the customer will be 'interested' in documents which have as their subjects the same subjects he is concerned with. The only attempt being made is to match subject to subject; no approval or disapproval of any document is implied. Therefore, if a man marks 'not of interest' because he has seen the document previously or because it advances a point of view contrary to his own, this would be an incorrect response to the system. Whether our customers understand this or not, at present, is unknown to us. But we shall attempt to clarify this for them.

If the card returned to TIC has been marked 'of interest, document requested', a full-size complete copy of the document is sent to the customer, with a response card attached (Figure 9). He is asked to return the response card, after he has read or scanned the document, indicating whether or not the document was relevant to his work.



NAME	MAN NUMBER	DEPT	BLDG	LOCATION	DATE	DOCUMENT NUMBER

This document may be viewed on your nearest microfilm reader

Comments .... ☐

PLEASE:

1. Read the abstract.
2. Punch the appropriate box(es).
3. If you wish, punch the comment box and write your comments.
4. Return the card.

Of interest, seen on microfilm .... ☐

Of interest, document requested .... ☐

Of interest, document not needed .... ☐

Of no interest .... ☐

Technical Information Center, **IBM, DSD, Poughkeepsie, N.Y.**

FIGURE 9. *Response card*

The problem of supplying 'hard copies' of documents to a number of customers (they are not *loaned,* they are *given*) is always a difficult one. We are certainly hopeful that in the long run, having multiple microfilms will reduce the demand for hard copies. For example, a man can easily check the microfilm copy to determine relevance, instead of ordering a complete copy and then discarding it after two minutes '. . . just to make sure I don't miss anything'.

We hope to discourage the building of personal collections of complete documents, by raising the *confidence factor* in the information system. If a man believes he can get *whatever* he wants, *whenever* he wants it, then he will have much less tendency to collect his own duplicate document file. As a partial substitute, the IBM-size abstract cards are convenient to handle, are advantageous of space, and contain good summaries of the documents. We find that many men are keeping the cards which are sent to them, and we are making plans to allow them to order the abstract cards for any documents in which they are interested and for which they do not yet have a card.

Several techniques are used to fulfil hard copy requirements. One is that we try to obtain twenty to thirty extra copies at the time of original printing. These copies are relatively inexpensive at that time and are especially good for the early-life demand on the document. We also use an extra copy of the microfilm to produce a transparent master or other type of master on our Copyflo machine. In short, we have used and are continuing to test every reproduction technique which is known to us. We do anticipate that copies produced from film will become less expensive, as technologies improve.

It can be seen that, with the return of the various cards to TIC, a rather detailed statistical analysis can be made for a number of factors. A machine programme is currently being written to do this on the IBM 1401. Our early experience is that approximately 70 per cent of the notification cards returned are favourable; the documents were in one of the 'of interest' categories. And, of course, in the remaining 30 per cent of the cases, the abstract card was punched 'not of interest'. Because a random pattern of dissemination would produce an 'of interest' percentage of 3 per cent or 4 per cent (three or four of every hundred documents are of interest to a particular customer), we feel that 70 per cent is quite satisfactory as a starting point. We hope to raise this percentage to 80, 85, or 90 per cent by some of the techniques described in the following section.

Improving SDI precision

It will be seen immediately that two types of errors can enter an SDI system. These may be seen plotted on a linear scale in Figure 10.

1. A document which is not in a customer's field and not of interest to him, is sent to him. He presumably will mark the response card 'not of interest'. In the manner of Hensley, Brandenberg, *et al.*[12, 13, 20] we will call this failure, 'trash'.
2. A document enters the system, contains material which a given man would like to see, but is not sent to him. In a similar manner, we will call this failure a 'miss'.

There is no question that a 'grey area' exists, as indicated by the shaded section. This would be an area where the man himself would not be sure, or where different men might have different opinions. However, our objective is to reduce this grey area to a workable minimum.

Quite obviously, the trash will be much easier for the customer to detect than the miss, because the miss does not generate an attention-getting and decision-making card, as the trash does. For this reason, our customers will be asked to scan the library bulletin as it is issued, checking to see what was missed and suitable to them, and to let us know about documents which SDI missed sending to them.

Both types of errors are results of the matching percentages somehow being wrong. In the case of miss, the match-percentage P was too low to exceed the threshold, and in the case of the trash the match P was too high. In the case of misses, the fault usually lies with the omission of one or two descriptors in the profile, in the index, or both. Thus, a match of perhaps two or three descriptors is made, but one more, perhaps two, are required. On examination, it usually is quite simple to note the descriptor or two which would have made the difference. Resulting from this, several profiles are having additional terms added to them.

Trash presents a more complex problem, in that the full problem of semantics is felt at this point. Those words which have a large number of meanings cause some difficulties. Our experience indicates that we should be cautious in our use of words which are very general. Also, we should not have too few terms in the document index.

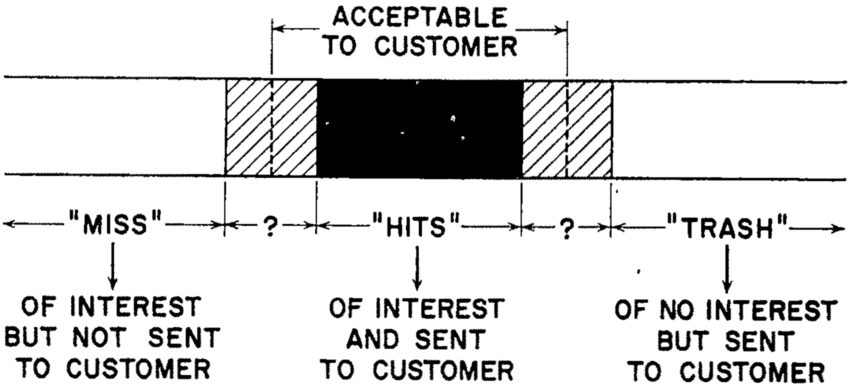

ACCEPTABLE TO CUSTOMER
"MISS"
?
"HITS"
?
"TRASH"
OF INTEREST BUT NOT SENT TO CUSTOMER
OF INTEREST AND SENT TO CUSTOMER
OF NO INTEREST BUT SENT TO CUSTOMER

FIGURE 10. *Hits, misses, and trash in selective dissemination of information (SDI)*

There are other adjustments which can be made to improve the degree of precision in the system. For example, the number of terms in a man's profile can be varied from high to low, and acceptable threshold match can be raised or lowered. Readers might be classified in four general categories: *a,* broad interests, heavy readers; *b,* broad interests, light readers; *c,* narrow interests, heavy readers; and *d,* narrow interests, light readers. Figure 11 shows the philosophy of adjusting the system in an attempt to meet each of these situations. It can be seen that a broad interests user is provided for by having a rather large number of terms in his profile; the narrow-interests reader has a low number of terms. For the heavy reader, a low-acceptable P will be used so that he will receive relatively more material; the light reader's higher P factor will reduce the amount of material sent to him.

		NUMBER OF TERMS IN PROFILE	THRESHOLD PERCENTAGE (P) ACCEPTABLE
BROAD INTERESTS	HEAVY READERS	HI	LO
	LIGHT READERS	HI	HI
NARROW INTERESTS	HEAVY READERS	LO	LO
	LIGHT READERS	LO	HI

FIGURE 11. *Adjustment of SDI System*

COMPUTER OPERATIONS

The computer operations are centred about an IBM 1401 and an IBM 7090, with some use of punched card input–output equipment. After the decklets of punched cards are prepared a proof listing is printed out 80–80 (one print position per punch card column). Figure 12 shows a listing of this information. The listings are proofread and corrections made.

```
TIC62-S1-003                                                TIC62-S1-0030-100C03
JOACHIM JW                                                  TIC62-S1-0031-100003
  A DATA REDUCTION COMPILER.#                               TIC62-S1-0032-100003
IBM FEDERAL SYSTEMS DIV. OWEGO  62-825-450 23P              TIC62-S1-0033 100003
8FIGS                                          JUL 62       TIC62-S1-0033-200003
62-825-450                                                  TIC62-S1-0034-100003
  REVIEWS DATA REDUCTION PROBLEMS IN DESIGNING              TIC62-S1-0035 100003
DATA REDUCTION PRUGRAMS.  DESCRIBES DATA                    TIC62-S1-0035 200003
REDUCTION COMPILER FOR INTERPRETING AND                     TIC62-S1-0035 300003
PROCESSING MAGNETIC TAPE CONTAINING FIXED                   TIC62-S1-0035 400003
POINT BINARY DATA AND READABLE BY                           TIC62-S1-0035 500003
IBM 709/7090.                                               TIC62-S1-0035-600003
COMPILERS                                                   TIC62-S1-0037 100C03
REDUCTION-SIZE OR AMOUNT                                    TIC62-S1-0037 200C03
PROGRAMS                                                    TIC62-S1-0037-300003
DATA//TAPES//MAGNETICS//DATA PROCESSING//                   TIC62-S1-0038 100003
IBM 0709//IBM 7090//REDUCERS-SIZE OR AMOUNT//               TIC62-S1-0038 200003
PROCESSING//INTERPRETING//COMPUTERS//                       TIC62-S1-0038 300003
PROGRAMMING//                                               TIC62-S1-0038-400003
```

FIGURE 12. *Printout of basic deck of cards*

The print programme performs the printing of the abstract card masters on the 1401, three cards to a sheet. This makes it convenient for multilith operators to produce abstract cards in quantity on full-size sheets, then to cut them into separate cards. Printing of abstract cards is done at 70 per cent of full size.

The SDI programme, which runs on the 7090, uses as input the personnel profiles and the new documents. The machine makes the comparison, as described in the SDI section, and produces a notification card as output whenever the percentage match is higher than the pre-determined threshold. Figure 7 showed a notification card. It can be seen that the 7090 supplies the following information as punched and printed in the card:

Customer name
Building number
Department number

Report number

The SDI run also produces a printed report, listing the various matches which resulted. This is an extremely useful report for TIC staff analysis because not only are the document-customer matched pairs shown, but also those descriptors which actually matched, and the resulting percentages. The first part of the report is in sequence by report number, and the second part is in order by customer name.

The bulletin programme on the 1401 produces the masters for the abstract bulletin. This is essentially a straight listing-type programme which replaces the work of manually typing the information required. (See Appendix A for a sample.) Printing is at 70 per cent of full size.

Appendix A also shows the subject index in the bulletin. This index is prepared on a 1401 using the index programme and contains several interesting features. The input for the programme is the magnetic tape which contains all the new reports indexed during the past two weeks. The computer has been programmed to sort all class 7 entries to an alphabetical order. Then, as it arranges the page image in storage, it places the complete title after the subject descriptor. When several reports appear after the same descriptor, the descriptor is not repeated. This makes for an attractive, readable index page. Programming also has been accomplished to cause the subject descriptor to be repeated if a new line begins with a continuation of a previous descriptor. The page image is built up in the machine, using a combination of core memory and tape, and is then printed out using the IBM 1403, printing both columns simultaneously. Only the words 'Subject Index' and the page number are pasted on each sheet manually before reproduction (reduced 45 per cent).

The author and publisher's code-number indexes are also prepared on the 1401. Sorting and printout are done in a straightforward manner. These are reduced 25 per cent.

MICROFILMS AND READER-PRINTERS

Every page of every document is photographed on 16 mm. unperforated microfilm at a reduction ratio of 24 to 1. Pages are arranged side by side along the length of the film (Figure 13). The microimages are 0.51 in., centre to centre, and allow approximately 2350 images on a 100-ft. reel of film. As our documents have been averaging about nineteen pages in length, there are approximately 120 documents on each reel. We also have measured the cubic displacement of several batches of documents, and we find that there is a reduction in volume of approximately 40 to 1 (40 cubic ft. of documents will be replaced by 1 cubic ft. of microfilm cartridges).

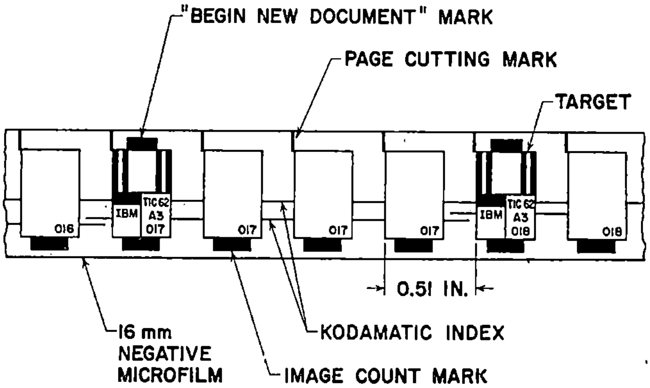


FIGURE 13. *Arrangement of pages on microfilm in Technical Information Center's cartridges*

Using a contract service, we have had made for us a negative master film, an intermediate positive, and a number of working negative prints for distribution. The master negative is stored in our archival company storage location; the intermediate positive will serve as a working master when additional negative prints are required. Ten copies of the negative prints are distributed to our ten viewing stations in the various laboratory buildings in Poughkeepsie. Other prints are distributed to other IBM library locations, including those outside the United States. In this respect, we are following to a degree the pattern set during World War II by the Microgram or V-Mail Service.[15, 16]

In Poughkeepsie, the microfilm reader-printers are of the Recordak Lodestar PES type. These machines are equipped with an automatic threading device, so that the person using the machine does not touch the microfilm. Films are returned to us from the processor in a plastic cartridge (they can also be had on plastic reels at slightly lower cost). This plastic cartridge is inserted in the viewer which automatically turns on the light source. The film can then be advanced through the machine at an adjustable speed by the use of a simple control lever. At maximum speed, the entire 100 feet of film can be put through the machine in 13 seconds. Techniques for finding a particular frame or series of frames are given below.

A print can be made of any page in approximately 25 seconds by pressing one button on the viewer-printer. The print is enlarged 21x, almost full size. Prints emerge from the machine slightly damp and they dry in two to three minutes. While this method of printing is expensive and time consuming, if a large number of pages are required, it is a very useful technique when the report is small or when only a few pages (ten or fewer) are required.

Several steps of special significance are taken in the preparation of the documents for microfilming. In general, all these preparations are aimed at making the microfilm easier to use, either by man or machine. We recognized that there is considerable reluctance on the part of some customers to utilize the microfilm facilities. So we are doing all we can to overcome these drawbacks, wherever possible. Also, we are looking forward to more sophisticated utilization of the microfilm by machines; for example, automatic printing of selected sections of roll microfilm at high speed. Specifically, these are some of the steps taken:

1. The Kodamatic 'index' is photographed between frames. This index consists of bars which show up on the screen as lines, when the film is advanced at speed. Figure 13 shows how this appears on microfilm. This index is not useful if a succession of short documents appears, as it changes too rapidly, but it is extremely valuable on many other documents.
2. The document accession number is stamped on each page of the document, in the lower right-hand corner. Admittedly, this consumes some time during preparation, but a tenfold or hundredfold saving is realized when the microfilm is in use.

Assume that our reader wishes document number TIC62–A5–043. He lifts cartridge number 62–A5 from the storage rack and inserts it into the machine. Using the high-speed film transport, he moves the film to the approximate position by matching the Kodamatic index lines. Stopping for a few seconds, he is able to see that he has stopped 'short', say at 036, or 'over', say at 049. A few more quick pushes of the handle in the proper direction and the document is located.

We have made some small tests which indicate that the document can be located in 40 to 60 seconds, even by a user making his first trial. After small practice, 20 to 25 seconds is normal.

The point to be noted is that *every page* is numbered, so that the correction, forward or backward, can be applied immediately. One knows within a second or two whether he should advance or rewind. There is no need to search for a title page of each document set.

3. Between documents there is a 'target page' (Figure 14). This page was made to have a very distinctive appearance, so that it is very noticeable as the documents are scanned.
4. The target page has a special pattern of black and white bars which can be utilized by future electric-eye sensing apparatus.
5. Above each target page, and outside the normal image area, a special black rectangle appears. This black spot can be used by future automatic sensing equipment to locate the starting and ending point of documents.
6. Below every page image another black rectangle appears. This is used to count frames in some experimental equipment being explored.
7. At the upper left-hand corner of every page, a cutting mark is photographed. This cutting mark is used in automatic machinery where the enlarged prints are printed on roll paper (such as Xerox Copyflo); the cutting mark allows the roll of paper to be cut into individual sheets on an automatic cutter.

In order that some measurements of the usage of the remote microfilm reader-printers may be obtained, an automatic monitoring device has been installed on each machine in the Poughkeepsie-Kingston area. This unit

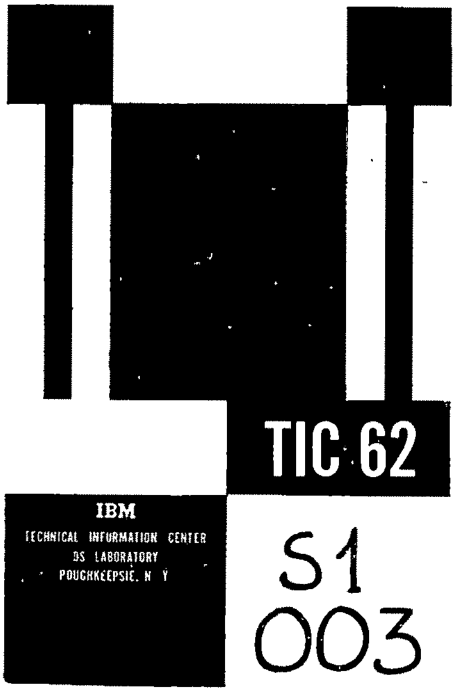


FIGURE 14.
Microfilm target

contains three counters and a two-pen, dual-track recorder. The counters will display the following totals:

a. Number of times a cartridge has been inserted;
b. Number of hard copy pages which have been made;
c. Number of minutes the viewer has been in operation.

The two-channel recorder will provide an ink record on paper tape of the relationship between the turn-on turn-off time, and the time when hard copies (if any) were made. For example, was the viewer on for 6 minutes during which time ten pages were copied? Or was the viewer on for 25 minutes, near the end of which three copies were made? Because the microfilm machines are in separated areas and are not under surveillance, we feel that these monitor units will provide much useful information concerning usage. This information can be analysed to determine such things as the number of machines required, the best placement for each machine, and the real need for hard copy producing ability.

As can be seen, we feel that much of the future of bulk storage of information will be in 'micro' form, with high speed techniques available for enlarging and printing full-size copies. Similar views are held by Schmiedel.[17]

ABSTRACT AND INDEX BULLETIN

The *Abstract and Index Bulletin* is perhaps the single item through which our system is becoming known and useful to the majority of our engineering and scientific personnel. It consists of four parts and, except for a few introductory pages, all copy is prepared on IBM automatic equipment. The four sections are: Abstracts, Subject Index, Author Index, and Source Code Index. Appendix A shows a small sample bulletin, prepared especially for this report, using eight IBM documents (non-confidential).

In the Abstract section, four documents per page are listed, although we are considering tightening this. For each document, all the information which was punched into cards is shown. There was some question about the need for showing the primary and secondary descriptors; however, we feel that it is wise to do this for two reasons. First, we expect to hear from our engineers and scientists as to the quality of our indexing. If we are not using their language, we would like to know about it. Second, we believe that these 'tracings', as it were, are useful as thought stimulators. The searcher is able to see at a glance the terms we used; hopefully, these terms will help him think of alternate and complementary terms which may be useful to him.

All the work of alphabetizing and sorting the entries for the various indexes is done by the IBM 1401. After sorting and arranging the data internally, the machine prints out the master copy for the bulletin pages. The format for the printing of the Subject Index is one which we feel is 'human factored' to be useful and efficient. Under each primary descriptor are listed the titles of the various reports which were indexed under that term, and their TIC identification numbers. Armed with these numbers, the researcher can then look up the complete reference in the Abstract Bulletin, or he can go directly to the microfilm viewer and see the complete document. The numbering scheme is identical in each case. We feel that this index format is a decided improvement over those indexes which merely give the descriptor and then a series of code numbers. In many cases, having the complete title available helps the customer to decide whether or not he wishes to pursue a given document further.

To some extent, we have not solved the problem of 'wading through' reports listed, raised by Coates.[18] This results from using primarily single-concept terms, with the concept co-ordination technique available for further specificity. Nevertheless, we feel that our approach represents a workable blending of manual and machine searchability, and thus far we have not encountered any serious problems.

When the copy is returned to TIC from the computing centre, it is cut into page sections, and pasted for photo reduction. After proofreading the page masters are sent to the reproduction department where they are reduced 30 per cent and printed by offset lithography. The bulletin pages are then collated, stapled, and distributed. Generally, copies of the bulletin are sent to all engineering and scientific departments in our divisional laboratories. For the other divisional libraries, special copies are printed on vellum, instead of opaque stock. Present plans in several locations, including our IBM British Laboratory, call for the further printing of the vellum master, either directly or by lithoplate, for local distribution.

At some point, consideration was given to the complete elimination of the abstract and index bulletin. The proposed substitute would be telephone inquiries to TIC with all searches being made by computer. This idea was completely rejected, however, by those who had actual experience in information dissemination and retrieval, because we realized the tremendous value of a bulletin which could be produced quickly, and which would contain a large amount of information in an extremely valuable form. Not to put this powerful tool into the hands of a large number of our users would be to limit the usefulness of the system immeasurably. As pointed out by R. P. Dick,[19] when discussing the use of telephone directories, a printed listing is the only practical method of coping with the problem of a large number of inquiries made at random times and for many different purposes.

In terms of cycle time for the complete operation, our goal is to have the documents appear in the bulletin approximately two weeks, on the average, after they are received at TIC. Although we have not yet achieved this 'put through' speed, we feel confident that it can be reached.

A new bulletin is issued every two weeks, along with the corresponding microfilm cartridges. We plan that quarterly cumulative indexes will be issued, probably printed on coloured paper. These will, of course, supersede the biweekly issues of the indexes. When taken together with the abstract sections of the individual issues, they will provide a very effective manual searching tool. For these cumulated indexes, the IBM 1401 computer will again be used to do the sorting of the entries and the printing of the master. No manual sorting or typing will be required.

RETRIEVAL

The retrieval situation may take many forms: one man wishes to casually browse through a few reports on subject A; another wishes an answer to a specific question such as 'Is the combination of A and D explosive?' Perhaps another man wishes an exhaustive list of all references to subject B and its variations. As a consequence of all of these variant requirements, no *single* method or system of obtaining information from a storage file will be equally effective in all situations.

For this reason the Technical Information Center provides a two-pronged approach which produces versatility and flexibility in many retrieval situations. The first approach is the provision for the index section of each bulletin (as well as the provision for quarterly cumulative indexes).

The second approach to retrieval is a machine search performed with the aid of an IBM 7090. Such a search is useful when an exhaustive review is required of all material, or when the engineer has a simple search but does not have the time to make it himself. Our 7090 programme is an updated version of a programme written earlier for the IBM 704.[14]

The file to be searched consists of a magnetic tape on which are stored, in alphabetical order, all the descriptors (either primary or secondary) in use in the system. After each descriptor is written a list of the TIC numbers which have been indexed under that descriptor.

On another magnetic tape is written the full summary of each document, including author, title, source, date, abstract, and descriptors. These are arranged in straight TIC-number sequence. When a search on a single subject is desired, a request card is keypunched and given to the computing centre. By the use of standard programmes, the operator is able to return to us a printed list of the summaries of the documents which contain the requested term. The machine has taken off the series of numbers listed under the descriptor on the first tape, has compared them with the second tape, and has printed out the summaries of those which were selected.

When a search is requested for two or more terms, a very similar procedure is used. Three relationships of terms may be used: AND, OR, and NOT. For example, if material on transistor manufacturing is desired, the request would be specified (Figure 15) as 'Transistors AND Manufacturing'. When making this search, the computer is programmed to record the numbers under Manufacturing (higher in the alphabet), and then to record the numbers under the heading Transistors. The computer then makes a final listing by comparing the two sets of numbers and preserving any numbers which appear in *both* listings. As before, this listing is used to select and print out the document summaries.

AND

TRANSISTORS and MANUFACTURING

OR

MICROFILMS or MICROPHOTOGRAPHY

NOT

TRANSISTORS and CIRCUITS
not RADIO not TELEVISION

FIGURE 15. *Relationship of search terms*

A search may be requested in which several alternatives may be given. For example 'Microfilms OR Microphotography' may be requested. Using a similar technique, the computer compares the lists and preserves the document numbers of those which appear on *either* list.

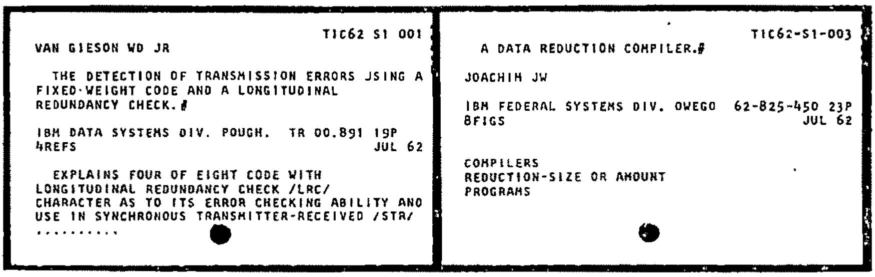
When using the NOT function, any numbers which appear under the NOT descriptor will be cancelled; thus, 'Transistors AND Circuits NOT Radio NOT Television' will retrieve documents indexed under Transistor Circuits, but will exclude any which were indexed under Radio OR Television.

It should be observed that what the computer is being asked to do in these searches is not the intellectual aspect of the search, but the purely clerical function. The computer is simply copying all the references which appear under specified headings. Time and manpower saving can be obtained because a person is not required to search through issue after issue, checking perhaps six, eight, or ten headings in each issue, and laboriously copying the complete references which appear. The computer does this, and presents the searcher with a neatly printed list of references.

An interesting feature of our computer search programme,[14] which seems little used elsewhere, is the use of a 'mask'. This mask allows the search to be conducted on less than a full descriptor, by blocking out all consideration of letters to the right of the mask. In effect, the comparison of the work is done on a truncated portion of the word rather than the full word. Although originally developed to be used in a system which allowed 'free' indexing, the masking feature has much utility. Take, for example, a search in which reports were desired on Computability, Computations, or Computers. The search request would use the term COMPUT$ where the special symbol $ would be used as the mask and as the next letter after the T.

In terms of capacity, the computer search programme allows us to make six completely independent searches in one pass of the machine. These may be for six different people, or may be six variations on a question put by one person. For practical searches, there is no limit to the number of terms which may be used, because the only programme limit is that the total number of appearances of search terms should not exceed 4,000.

We realize that this form of searching is rather elementary. Some consideration is being given to other techniques, the most promising of which involves the 'weighting' of the search terms in order to obtain a figure-of-merit for each document retrieved. A possible way to do this is to assign weights or values to each search term, according to the estimated worth to the searcher. For example, on a 1-to-9 scale, assignments might be made as follows: $A = 6$, $B = 9$, $C = 1$, $D = 3$, $E = 9$, and $F = 6$. Now, if a given document contains descriptors A, C, and F it will be valued at 13, whereas a document containing B, E, and F will be valued at 24. Conceivably, in a large collection from which the elementary search programme might retrieve a very large number of documents which appear to be pertinent, this method of evaluating or ranking the documents could be extremely useful. It also could be adapted for use in a more sophisticated SDI system.



```
                                     TIC62 S1 001
VAN GIESON WD JR

  THE DETECTION OF TRANSMISSION ERRORS JSING A
FIXED·WEIGHT CODE AND A LONGITUDINAL
REDUNDANCY CHECK.#

IBM DATA SYSTEMS DIV. POUGH.  TR 00.891 19P
4REFS                                  JUL 62

  EXPLAINS FOUR OF EIGHT CODE WITH
LONGITUDINAL REDUNDANCY CHECK /LRC/
CHARACTER AS TO ITS ERROR CHECKING ABILITY ANO
USE IN SYNCHRONOUS TRANSMITTER-RECEIVED /STR/
..........
```

```
                                     TIC62-S1-003
  A DATA REDUCTION COMPILER.#

JOACHIM JW

IBM FEDERAL SYSTEMS DIV. OWEGO  62-825-450 23P
8FIGS                                  JUL 62

COMPILERS
REDUCTION-SIZE OR AMOUNT
PROGRAMS
```

FIGURE 16. *Machine-produced 3 × 5-in. cards*

LIBRARY CATALOGUE CARDS

The basic set of punched cards also can be used to prepare catalogue cards on an IBM 407 (or 1401). Some samples of possible formats of these cards are shown in Figure 16. The left-hand card illustrates the author as the first entry, with title, source and abstract listed below (classes 0, 1, 2, 3, 5). The right-hand card provides title, author, source, and primary descriptors (classes 0, 2, 1, 3, 7).

The data entries can be arranged in many combinations, depending on the requirement of the particular library. Our system is basically an outgrowth of the Durkin and White system.[9]

ACKNOWLEDGMENTS

The author thanks all those people who contributed advice and assistance during the development of this system. In particular, he expresses his personal thanks to Mr T. G. Floros for his many thought-provoking discussions; to Mr P. J. Nelson for his help in preparing this report; and to Dr A. B. Credle for his unfailing support and encouragement throughout the project.

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APPENDIX

Abstract and Index Bulletin

The following pages present a sample of the content of the bi-weekly Abstract and Index Bulletin issued by the Technical Information Center (TIC). It was prepared from eight non-confidential documents and is in the form of the standard Bulletin. Not shown are the pages with introductory and administrative information. A typical standard Bulletin contains information on approximately 115 documents.

ABSTRACTS

TIC62-S1-001

VAN GIESON WD JR

THE DETECTION OF TRANSMISSION ERRORS USING A FIXED-WEIGHT CODE AND A LONGITUDINAL REDUNDANCY CHECK.#

IBM DATA SYSTEMS DIV. POUGH. TR 00.891 19P
4REFS JUL 62

EXPLAINS FOUR-OF-EIGHT CODE WITH LONGITUDINAL REDUNDANCY CHECK /LRC/ CHARACTER AS TO ITS ERROR CHECKING ABILITY AND USE IN SYNCHRONOUS TRANSMITTER-RECEIVED /STR/ TERMINALS. TRANSMISSION EFFICIENCY OF LINES TESTED INDICATES THAT ERROR CORRECTION BY RETRANSMISSION APPEARS MORE ADVANTAGEOUS THAN BY CODING TECHNIQUES.

ERRORS
TRANSMISSION
DETECTION

DETECTORS//CODING//CODES//CHECKS//REDUNDANCY//
LONGITUDINAL//TELE-PROCESSING//TESTS//
TESTING//BITS-INFORMATION//TERMINALS//
CHARACTERS-ALPHA AND NUMERIC//

TIC62-S1-002

LEWIS DW

THE SLIDER-CRANK MECHANISM.#

IBM GENERAL PRODUCTS DIV. ENDICOTT
TR 01.15.001.698 40P AUG 62

PRESENTS KINEMATICS OF SLIDER-CRANK MECHANISM BY MATHEMATICAL RELATIONSHIPS AND BY GRAPHICS, THE LATTER INCLUDING 30 GRAPHS. GIVES DYNAMIC ANALYSIS AND PROVIDES MATHEMATICAL EXPRESSIONS FOR CALCULATING BEARING LOADS.

SLIDER-CRANK
CRANKS
SLIDES

RODS//BARS//RELATIONSHIPS//BEARINGS//LOADS//
KINEMATICS//MATHEMATICS//GRAPHS//

TIC62-S1-003

JOACHIM JW

A DATA REDUCTION COMPILER.#

IBM FEDERAL SYSTEMS DIV. OWEGO 62-825-450 23P
8FIGS JUL 62

REVIEWS DATA REDUCTION PROBLEMS IN DESIGNING DATA REDUCTION PROGRAMS. DESCRIBES DATA REDUCTION COMPILER FOR INTERPRETING AND PROCESSING MAGNETIC TAPE CONTAINING FIXED-POINT BINARY DATA AND READABLE BY IBM 709/7090.

COMPILERS
REDUCTION-SIZE OR AMOUNT
PROGRAMS

DATA//TAPES//MAGNETICS//DATA PROCESSING//
IBM 0709//IBM 7090//REDUCERS-SIZE OR AMOUNT//
PROCESSING//INTERPRETING//COMPUTERS//
PROGRAMMING//

TIC62-S1-004

WYNER AD

LOW DENSITY BURST-CORRECTING CODES.#

IBM RESEARCH YORKTOWN HGTS. NC-112 4P 4REFS
JUL 62

PRESENTS LOW DENSITY BURST-CORRECTING CODE THAT CORRECTS CLUSTERS OF OR FEWER ERRORS THAT OCCUR WITHIN CONSECUTIVE DIGITS.

CODES
CODING
CORRECTION

ERRORS//MODELS//DENSITY//CLUSTERS//LOW//
BURSTS//DIGITS//THEOREMS//

ABSTRACTS

TIC62-S1-005

LLOYD JC
KUPTSIS JD

X-RAY SPECTROGRAPHIC ANALYSIS OF RARE EARTHS IN YTTRIUM IRON GARNET POWDERS.#

IBM RESEARCH YORKTOWN HGTS. NC-117 14P 2REFS
JUL 62

REPORTS DEVELOPMENT OF X-RAY SPECTROGRAPHIC SCHEMES FOR ANALYSIS OF RARE EARTH SUBSTITUTED YTTRIUM-IRON GARNETS.

SPECTROGRAPHY
RARE EARTHS
GARNETS

SUBSTITUTION//X-RAYS//LIGHT-ENERGY//TERBIUM//
BEAMS-RADIATION//ANALYZING//PRASEODYMIUM//
DYSPROSIUM//HOLMIUM//ERBIUM//YTTERBIUM//
THULIUM//NEODYMIUM//POWDERS-PARTICLES//
CRYSTALS//YTTRIUM//IRON//EUROPIUM//CERIUM//
SAMARIUM//MAGNETICS//

TIC62-S1-006

PICCIANO JK
POST FL
VOGL NG JR

ELECTRONIC INTEGRATION SYSTEM FOR LOW LEVEL FAST SIGNALS.#

IBM TECHNICAL DISCLOSURE BULLETIN VOL 4 NO.12
PAGES 105-106 DISCLOSURE #140,038 MAY 62

INTEGRATES INPUT SIGNAL, CONTROL SIGNAL. AND TRIGGER SIGNAL BY USE OF SAMPLING OSCILLOSCOPE, DIFFERENTIAL AMPLIFIER, AND RELAY CIRCUITS TO PROVIDE CONTROLLED PULSED OUTPUTS.

SIGNALS
INTEGRATORS
INSTRUMENTATION

OSCILLOSCOPES//NANOSECONDS//TRIGGERS//
PULSATIONS//HEWLETT-PACKARD//AMPLIFIERS//
DIFFERENTIAL//CIRCUITS//INPUT//OUTPUT//

TIC62-S1-007

KUMP HJ

AN EXPERIMENTAL MAGNETIC PRINTER.#

IBM GENERAL PRODUCTS DIV. ENDICOTT
TR 01.05.106.686 16P 15FIGS MAY 62

DESCRIBES MAGNETIC COMPONENTS AND THEIR FUNCTIONS IN PRINTER. USES MATRIX FORMATION OF CHARACTERS ON DRUM SURFACE BY APPLICATION OF MAGNETIC FIELD. MAGNETIC SPOTS ARE THEN DEVELOPED, FIXED, AND PRINTED.

PRINTERS
MAGNETICS
CHARACTERS-ALPHA AND NUMERIC

MATRICES//RECORDING//DRUMS-NOT CONTAINERS//
OPTICS//HEADS//PRINTING//SPEED//ELECTRONIC//

TIC62-S1-008

HURLEY RB

INTRODUCTION TO PROBABILITY.#

IBM GENERAL PRODUCTS DIV. SAN JOSE TR 02.224
16P AUG 62

TUTORIAL PAPER GIVES INTRODUCTION TO PERMUTATIONS, COMBINATIONS, AND PROBABILITY, WITH ORIENTATION TO RELIABILITY.

PROBABILITY
RELIABILITY
PERMUTATIONS

COMPUTATIONS//RELATIONSHIPS//STATISTICS//
COMBINATIONS//SEQUENCING//SORTING//

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WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Member of Translators' Guild. Roumanian and French. 161 Rivermead Court, London SW6. Renown 1912.

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LIBRARIANS (Grade IV) in Government departments. Eight pensionable posts for men or women at least 22 on 1st December 1962 in *a,* GOVERNMENT COMMUNICATIONS HEADQUARTERS, Cheltenham; *b,* CENTRAL OFFICE OF INFORMATION, London; *c,* HM STATIONERY OFFICE, London; *d,* ARMY CENTRAL LIBRARY, London; *e,* ARMY COMMAND LIBRARIES, Hounslow, Salisbury, York, and Lisburn (N. Ireland). Candidates must have passed Library Association's Registration Examination or hold London University Diploma in Librarianship. In addition, for post *a,* knowledge of foreign language(s), and experience in telecommunications and electronics, desirable. Post *b* calls for thorough knowledge of bibliographical sources and ability to locate and obtain information on the work of Government departments and other organizations; experience of staff supervision essential. Post *c* requires knowledge of the functions of Government departments and of their publications; also sufficient cataloguing experience to undertake reorganization of cataloguing service. Starting salary (inner London) £726 at 22 to £850 at 25 or over (or possibly higher at 26 or over). Scale maximum £1,260. Promotion prospects. Write Civil Service Commission, Burlington Gardens, London W1, for application form, quoting 5587/62. Closing date 31st December 1962.

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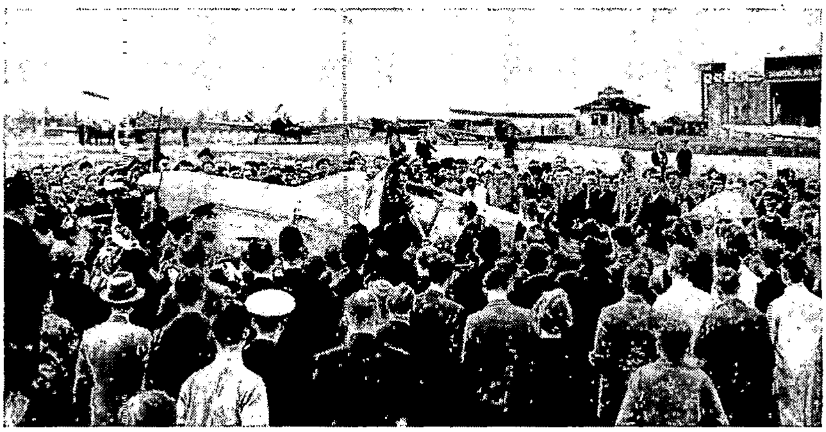

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